

**Unmanned Maritime Autonomy Architecture (UMAA)  
Experimental Services (EXP)  
Interface Control Document (ICD)  
(UMAA-SPEC-EXPICD)**

**MDE Version 5.0.1**

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# 1 Scope

## 1.1 Identification

This document defines a set of *experimental* services as part of the Unmanned Maritime Autonomy Architecture (UMAA)—experimental services are not required to satisfy UMAA compliance, but are provided to industry for feedback. As such, it provides services that are in an experimental state and are in the process of being developed. This document is generated automatically from data models that define its services and their interfaces as part of the Unmanned Systems (UxS) Control Segment (UCS) Architecture as extended by UMAA to provide autonomy services for unmanned vehicles.

To put each ICD in context of the UMAA Architecture Design Description (ADD), the UMAA functional decomposition mapping to UMAA ICDs is shown in Figure 1.

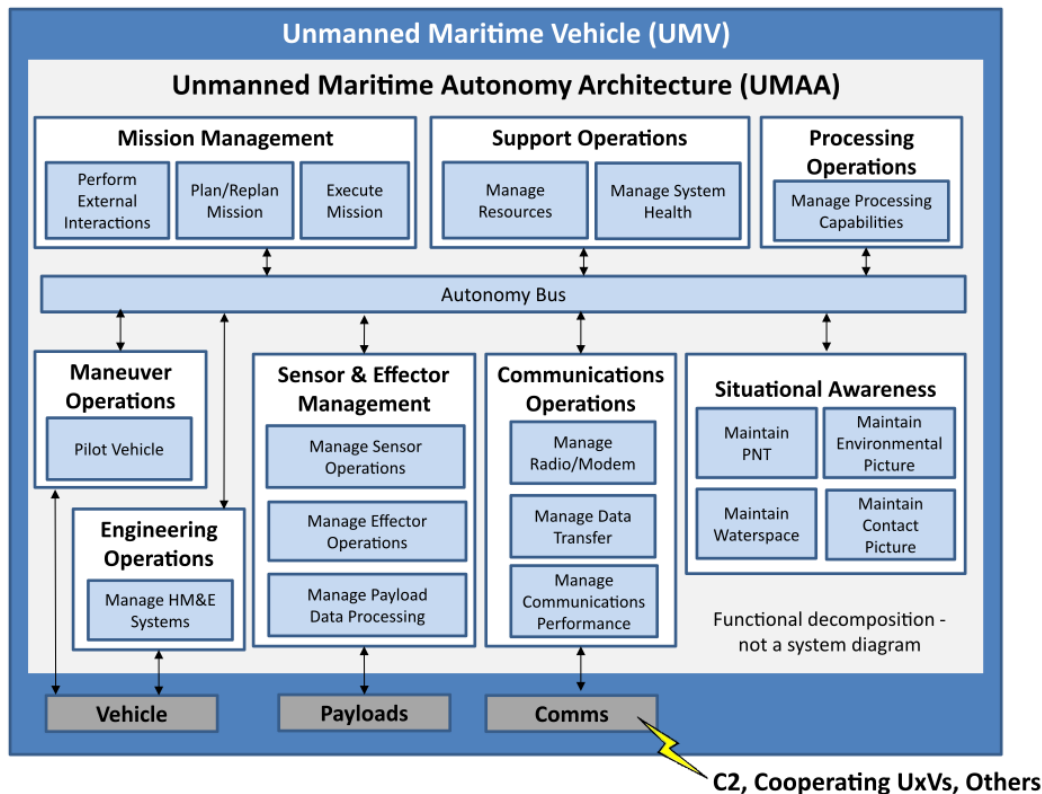


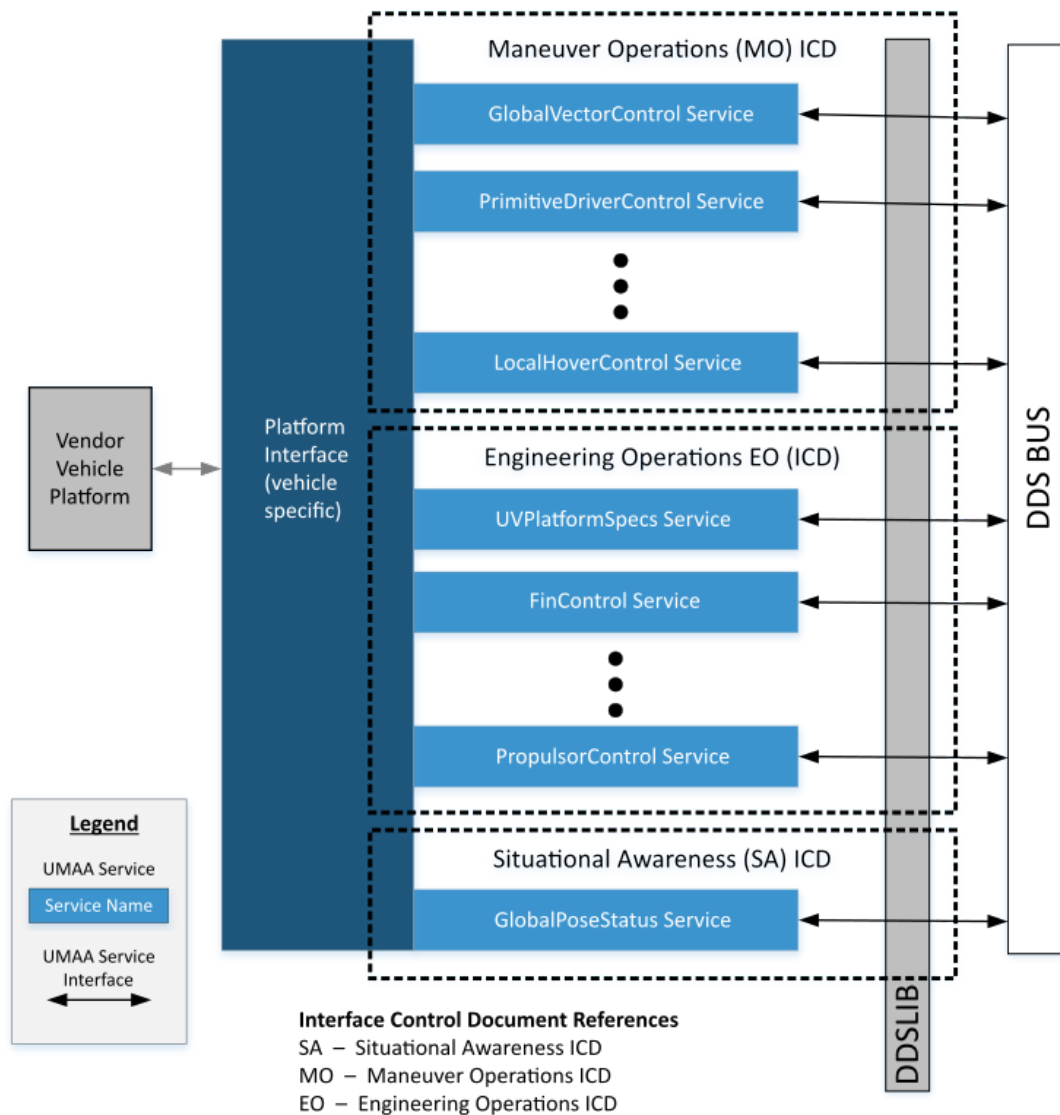
Figure 1: UMAA Functional Organization.

## 1.2 Overview

The fundamental purpose of UMAA is to promote the development of common, modular, and scalable software for unmanned vehicles that is independent of a particular autonomy implementation. Unmanned Maritime Systems (UMSs) consist of Command and Control (C2), one or more unmanned vehicles, and support equipment and software (e.g. recovery system, Post Mission Analysis applications). The scope of UMAA is focused on the autonomy that resides on-board the unmanned vehicle. This includes the autonomy for all classes of unmanned vehicles and must support varying levels of communication in mission (i.e., constant, intermittent, or none) with external systems. To enable modular development and upgrade of the functional capabilities of the on-board autonomy, UMAA defines eight high-level functions. These core functions include: Communications Operations, Engineering Operations, Maneuver Operations, Mission Management, Processing Operations, Sensor and Effector Operations, Situational Awareness, and Support Operations. In each of these areas, it is anticipated that new capabilities will be required to satisfy evolving Navy missions over time. UMAA seeks to define standard interfaces for these functions so that individual programs can leverage capabilities developed to these standard interfaces across programs that meet the standard interface specifications. Individual programs may group services and interfaces into components in different ways to serve their particular vehicle's needs. However, the entire interface defined by UMAA will be required as defined in the ICDs for all services that are included in a component. This requirement is what enables autonomy software to be ported between heterogeneous UMAA-compliant vehicles with their disparate vendor-defined vehicle control interfaces.

without recoding to a vehicle-specific interface.

Experimental Services defines the services that are still under early state development. Figure 2 depicts an example of possible component service groupings (designated by dashed lines).



**Figure 2:** UMAA Services and Interfaces Example.

### 1.3 Document Organization

This interface control document is organized as follows:

Section 1 – Scope: A brief purview of this document

Section 2 – Referenced Documents: A listing of associated of government and non-government documents and standards

Section 3 – Introduction to Data Model, Services, and Interfaces: A description of the common data model across all services and interfaces

Section 4 – Introduction to Coordinate Reference Frames and Position Model: An overview of the reference frame model used by UMAA

Section 5 – Flow Control: A description of different flow control patterns used throughout UMAA

Section 6 – Experimental Services (EXP) Services and Interfaces: A description of specific services and interfaces for this ICD

## 2 Referenced Documents

The documents in the following table were used in the creation of the UMAA interface design documents. Not all references may be applicable to this particular document.

**Table 1:** Standards Documents

| <b>Title</b>                                                                                                                            | <b>Release Date</b> |
|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| A Universally Unique Identifier (UUID) URN Namespace                                                                                    | July 2005           |
| Data Distribution Service for Real-Time Systems Specification, Version 1.4                                                              | March 2015          |
| Data Distribution Service Interoperability Wire Protocol (DDSI-RTPS), Version 2.3                                                       | April 2019          |
| Object Management Group Interface Definition Language Specification (IDL)                                                               | March 2018          |
| Extensible and Dynamic Topic Types for DDS, Version 1.3                                                                                 | February 2020       |
| UAS Control Segment (UCS) Architecture, Architecture Description, Version 2.4                                                           | 27 March 2015       |
| UCS Architecture, Conformance Specification, Version 2.2                                                                                | 27 September 2014   |
| UCS-SPEC-MODEL v3.4 Enterprise Architect Model                                                                                          | 27 March 2015       |
| UCS Architecture, Architecture Technical Governance, Version 2.5                                                                        | 27 March 2015       |
| System Modeling Language Specification, Version 1.5                                                                                     | May 2017            |
| Unified Modeling Language Specification, Version 2.5.1                                                                                  | December 2017       |
| Interface Definition Language (IDL), Version 4.2                                                                                        | March 2018          |
| U.S. Department Of Homeland Security, United States Coast Guard<br>"Navigation Rules International-Inland" COMDTINST M16672.2D          | March 1999          |
| IEEE 1003.1-2017 - IEEE Standard for Information Technology—Portable Operating System Interface (POSIX(R)) Base Specifications, Issue 7 | December 2017       |
| Guard, U. C. (2018). Navigation Rules and Regulations Handbook: International—Inland. Simon and Schuster.                               | June 2018           |
| Department of Defense Interface Standard: Joint Military Symbology (MIL-STD-2525D Appendix A)                                           | 10 June 2014        |
| DOD Dictionary of Military and Associated Terms                                                                                         | August 2018         |

**Table 2:** Government Documents

| <b>Title</b>                                                                                      | <b>Release Date</b> |
|---------------------------------------------------------------------------------------------------|---------------------|
| Unmanned Maritime Autonomy Architecture (UMAA) Architecture Design Description (ADD), Version 1.0 | January 2019        |
| Manual for the Submission of Oceanographic Data Collected by Unmanned Undersea Vehicles (UUVs)    | October 2018        |

## 3 Introduction to Data Model, Services, and Interfaces

### 3.1 Data Model

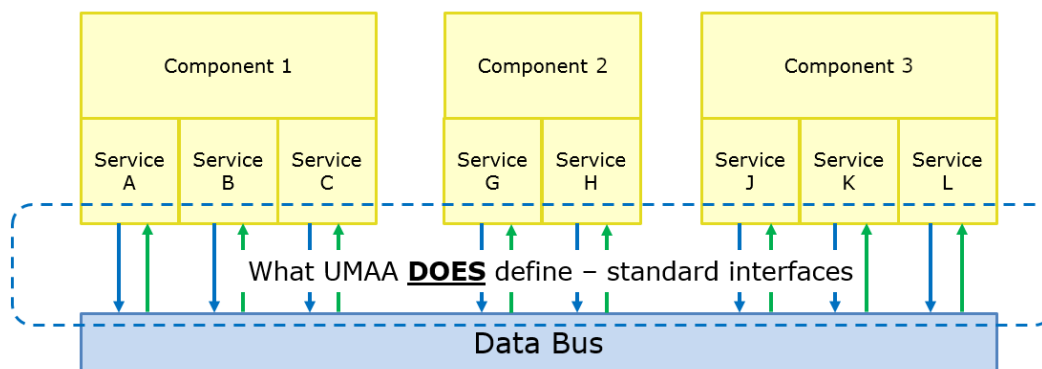
A common data model is at the heart of UMAA. The common data model describes the entities that represent system state data, the attributes of those entities and relationships between those entities. This is a "data at rest" view of system-level information. It also contains data classes that define types of messages that will be produced by components, or a "data in motion" view of system-level information.

The common data model and coordinated service interfaces are described in a Unified Modeling Language (UML<sup>TM</sup>) modeling tool and are represented as UML<sup>TM</sup> class diagrams. Interface definition source code for messages/topics and other interface definition products and documentation will be automatically generated from the common data model so that they are consistent with the data model and to ensure that delivered software matches its interface specification.

The data model is maintained as a Multi-Domain Extension (MDE) to the UCS Architecture and will be maintained under configuration control by the UMAA Board as UCSMDE and will be incrementally integrated into the core UCS standard. Section 6 content is automatically generated from this data model, as are other automated products such as IDL that are used for automated code generation.

### 3.2 Definitions

UMAA ICDs follow the UCS terminology definitions found in the UCS Architecture Description v2.4. The normative (required) implementation to satisfy the requirements of a UMAA ICD is to provide service and interface specification compliance. Components may group services and required interfaces in any manner so long as every service meets its interface specifications. Figure 3 shows a particular grouping of services into components. The interfaces are represented by the blue and green lines and may equate to one or more independent input and output interfaces for each service. The implementation of the service into software components is left up to the individual system development. Given this context, section 6 correspondingly defines services with their interfaces and not components.



**Figure 3:** Services and Interfaces Exposed on the UMAA Data Bus.

Services may use other services within this ICD, or in other UMAA defined ICDs, to provide their capability. Additionally, components for acquisition and development may span multiple ICDs. An example of this would be a commercial radar that provides both status and control of the unit via the radar's software Application Programming Interface (API).

### 3.3 Data Distribution Service (DDS<sup>TM</sup>)

The data bus supporting autonomy messaging (as seen in Figure 3) is implemented via DDS<sup>TM</sup>. DDS is a middleware protocol and API standard for data-centric connectivity from the Object Management Group (OMG). It integrates the components of a system together, providing low-latency data connectivity, extreme reliability, and a scalable architecture. In a distributed system, middleware is the software layer that lies between the operating system and applications. It enables the various system components to more easily communicate and share data. It simplifies the development of distributed systems by letting software developers focus on the specific purpose of their applications rather than the mechanics of passing information between applications and systems. The DDS specification is fully described in free reference material on the OMG website and there are both open source and commercially available implementations.

### 3.4 Naming Conventions

UMAA services are modeled within the UCS Architecture under the Multi-Domain Extension (MDE). The UCS Architecture uses SoaML concepts of participant, serviceInterface, service port, and request port to describe the interfaces that make up a service and show how the service is used. Each service defines the capability it provides as well as required interfaces. Each interface consists of an operation that accepts a single message (A SoaML MessageType). In SoaML, a MessageType is defined as a unit of information exchanged between participant Request and Service ports via ServiceInterfaces. Instances of a MessageType are passed as parameters in ServiceInterface operations. (Reference: [UCS Architecture](#), [Architecture Technical Governance](#))

To promote commonality across service definitions, a common way of naming services and their sets of operations and messages has been adopted for defining services within UCS-MDE. The convention uses the Service Base Name <SBN> and an optional Function Name [FN] to derive all service names and their associated operations and messages. As this is meant to be a guide, services might not include all of the defined operations and messages and their names might not follow the convention where a more appropriate name adds clarity.

Furthermore, services in UMAA are not required to be defined as indicated in Table 3 when all parts of the service capabilities are required for the service to be meaningful (such as ResourceAllocation).

Additionally, note that for UMAA not all operations defined in UCS-MDE result in a message being published to the DDS bus, e.g., since DDS uses publish/subscribe, most query operations result in a subscription to a topic and do not actually publish the associated request message. In the case of cancel commands, there is no associated implementation of the cancel<SBN>[FN]CommandStatus as it is just the intrinsic response of the DDS dispose function; so, it is essentially a NOOP (no operation) in implementation. The conventions used to define UCS-MDE services are as follows:

Service Name

<SBN>[FN]Config  
 <SBN>[FN]Control  
 <SBN>[FN]Specs  
 <SBN>[FN]Status OR Report

where the SBN should be descriptive of the task or information provided by the service. Note that the FN is optional and only included if needed to clarify the function of the service. The suffixes Status and Report are interchangeable. If a "Report" is a more appropriate description of the service, it can be used in lieu of "Status".

**Table 3:** Service Requests and Associated Responses

|                  | Service Requests (Inputs)                                                                                                             | Service Responses (Outputs)                                                                                                                                                 |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Config           | set<SBN>[FN]Config<br>query<SBN>[FN]ConfigAck<br>query<SBN>[FN]Config<br>cancel<SBN>[FN]Config<br>query<SBN>[FN]ConfigExecutionStatus | report<SBN>[FN]ConfigCommandStatus<br>report<SBN>[FN]ConfigAck<br>report<SBN>[FN]Config<br>report<SBN>[FN]CancelConfigCommandStatus<br>report<SBN>[FN]ConfigExecutionStatus |
| Control          | set<SBN>[FN]<br>query<SBN>[FN]CommandAck<br>cancel<SBN>[FN]Command<br>query<SBN>[FN]ExecutionStatus                                   | report<SBN>[FN]CommandStatus<br>report<SBN>[FN]CommandAck<br>report<SBN>[FN]CancelCommandStatus<br>report<SBN>[FN]ExecutionStatus                                           |
| Specs            | query<SBN>[FN]Specs                                                                                                                   | report<SBN>[FN]Specs                                                                                                                                                        |
| Status OR Report | query<SBN>[FN]                                                                                                                        | report<SBN>[FN]                                                                                                                                                             |

Service Requests (operation:message)

set<SBN>[FN]Config:<SBN>[FN]ConfigCommandType

```

query<SBN>[FN]Config:<SBN>[FN]ConfigRequestType1
set<SBN>[FN]:<SBN>[FN]CommandType
query<SBN>[FN]CommandAck:<SBN>[FN]CommandAckRequestType1
cancel<SBN>[FN]Command:<SBN>[FN]CancelCommandType1
cancel<SBN>[FN]Config:<SBN>[FN]CancelConfigType1
query<SBN>[FN]ExecutionStatus:<SBN>[FN]ExecutionStatusRequestType1
query<SBN>[FN]ConfigExecutionStatus:<SBN>[FN]ConfigExecutionStatusRequestType1
query<SBN>[FN]ConfigAck:<SBN>[FN]ConfigAckRequestType1
query<SBN>[FN]Specs:<SBN>[FN]SpecsRequestType1
query<SBN>[FN]:<SBN>[FN]RequestType1 2

```

#### Service Responses (operation:message)

```

report<SBN>[FN]ConfigCommandStatus:<SBN>[FN]ConfigCommandStatusType
report<SBN>[FN]Config:<SBN>[FN]ConfigReportType
report<SBN>[FN]ConfigAck:<SBN>[FN]ConfigAckReportType
report<SBN>[FN]CommandStatus:<SBN>[FN]CommandStatusType
report<SBN>[FN]CommandAck:<SBN>[FN]CommandAckReportType
report<SBN>[FN]CancelCommandStatus:<SBN>[FN]CancelCommandStatusType1
report<SBN>[FN]CancelConfigCommandStatus:<SBN>[FN]CancelConfigCommandStatusType1
report<SBN>[FN]ExecutionStatus:<SBN>[FN]ExecutionStatusReportType
report<SBN>[FN]ConfigExecutionStatus:<SBN>[FN]ConfigExecutionStatusReportType
report<SBN>[FN]Specs:<SBN>[FN]SpecsReportType
report<SBN>[FN]:<SBN>[FN]ReportType

```

where,

- Config (Configuration) Command/Report – This is the setup of a resource for operation of a particular task. Attributes may be static or variable. Examples include: maximum RPM allowed, operational sonar frequency range allowed, and maximum allowable radio transmit power.
- Command Status – This is the current state of a particular command (either control or configuration).
- Command – This is the ability to influence or direct the behavior of a resource during operation of a particular task. Attributes are variable. Examples include a vehicle's speed, engine RPM, antenna raising/lowering, and controlling a light or gong.
- Command Ack (Acknowledgement) Report – This is the command currently being executed.
- Cancel – This is the ability to cancel a particular command that has been issued.
- Execution Status Report – This is the status related to executing a particular command. Examples associated with a waypoint command include cross track error, time to achieve, and distance remaining.
- Specs (Specifications) Report – Provides a detailed description of a resource and/or its capabilities and constraints. Attributes are static. Examples include: maximum RPM of a motor, minimum frequency of a passive sonar sensor, length of the unmanned vehicle, and cycle time of a radar.
- Report – This is the current information being provided by a resource. Examples include vehicle speed, rudder angle, current waypoint, and contact bearing.

### 3.5 Namespace Conventions

Each UMAA service and the messages under the service can be accessed through their appropriate UMAA namespace. The namespace reflects the mapping of a specific service to its parent ICD, and the parent ICD's mapping to the overall UMAA Design Description. For example:

Access the Primitive Driver Control service under Maneuver Operations:

UMAA::MO::PrimitiveDriverControl

Access the ContactReport Service under Situational Awareness:

<sup>1</sup>These message types are required for UCS model rules of construction, but are not implemented as messages in the UMAA specification.

<sup>2</sup>At this time, there are no Requests in the specification. This will be the message format when Requests have been added.

UMAA::SA::ContactReport

The UMAA model uses common data types that are re-used through the model to define service interface topics, interface topics, and other common data topics. These data types are not intended to be directly utilized but, for reference, they can be accessed in the same manner:

Access the common UMAA Status Message Fields:

UMAA::UMAASStatus

Access the common UMAA GeoPosition2D (i.e., latitude and longitude) structure:

UMAA::Common::Measurement::GeoPosition2D

## 3.6 Cybersecurity

The UMAA standard addressed in this ICD is independent from defining specific measures to achieve Cybersecurity compliance. This UMAA ICD does not preclude the incorporation of security measures, nor does it imply or guarantee any level of Cybersecurity within a system. Cybersecurity compliance will be performed on a program-specific basis and compliance testing is outside the scope of UMAA.

## 3.7 GUID algorithm

The UMAA standard utilizes the Globally Unique Identifier (GUID), conforming to the variant defined in RFC 4122 (variant value of 2). Generators of GUIDs may generate GUIDs of any valid, RFC 4122-defined version that is appropriate for their specific use case and requirements. (Reference: [A Universally Unique Identifier \(UUID\) URN Namespace](#))

## 3.8 Large Collections

The UMAA standard defines Large Collections, which are collections of decoupled but related data. Large Collections provide the ability to update one or more elements of the collection without republishing the entire collection to the DDS bus. This avoids two problems related to using an unbounded sequence type in a DDS message: 1) resource consumption growing as the collection is appended to or updated, and 2) DDS implementation-specific limitations on unbounded sequences. There are two implementations of a Large Collection: the Large Set (unordered) and the Large List (ordered).

In both Large Collection implementations, there are two important abstractions: the collection metadata and collection element type. Because Large Collections are specific to the UMAA PSM, the type definitions for the collection metadata and collection element are not part of MDE, and the IDL definitions of these types are generated separately. A particular UMAA message that has a Large Collection attribute will reference the metadata type (LargeSetMetadata or LargeListMetadata). The collection element type is defined under the same namespace as the message that uses it, and follows the naming pattern <parent message name><attribute name><collection type>Element. Each element of the collection is published as a separate message on the DDS bus, and can be tracked back to their related collection using the setID or listID. Users can also trace an element in a set to the source attribute (a NumericGUID) of the Service Provider that generated the report with this set using the collection metadata.

### 3.8.1 Necessary QoS

To achieve the Large Collection consistency in the update process described below, ordering of samples on the collection element type topic is necessary. Therefore, publishers and subscribers to the collection element type topic must use the PRESENTATION QoS policy with an access\_scope of DDS\_TOPIC\_PRESENTATION\_QOS and ordered\_access.

### 3.8.2 Updating Large Collections

When elements of the collection are updated, the metadata must be updated as well to signal a change in the set. The updateElementID is updated to match the elementID of the element whose reception signals the end of the atomic update of the collection. Because of the requirement of an ordered topic described above, this will be the element that is updated last chronologically. The metadata updateElementTimestamp must be updated to the timestamp of the same element that signals the end of the update.

The set can be updated as a batch (multiple elements in a single "update cycle," as determined by the provider). This allows for a coarse synchronization: data elements that do not match the metadata updateElementID and updateElementTimestamp can be assumed to be part of an in-progress update cycle. Consumers can choose to immediately act on those data individually

or wait until the matching element is received to signal that the complete update cycle has finished and consider the set as a whole. Note that the coarseness of synchronization is service-dependent: in some cases an intermediate view of a collection update may be logically incorrect to act upon.

### 3.8.3 Specifying an Empty Large Collection

A particular Large Collection can be empty during initial creation. This is indicated by publishing metadata with a **size** of zero and an **updateElementID** set to the Nil UUID. As specified in section 4.1.7 of the referenced document "A Universally Unique Identifier (UUID) URN Namespace", this is a "special form of UUID that is specified to have all 128 bits set to zero".

### 3.8.4 Large Set Types

The following details the LargeSetMetadata structure:

**Table 4:** LargeSetMetadata Structure Definition

| Attribute Name          | Attribute Type      | Attribute Description                                                                                                                                                                                                                                                                   |
|-------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| setID                   | NumericGUID         | Identifies the Large Set instance this metadata relates to.                                                                                                                                                                                                                             |
| updateElementID         | NumericGUID         | This field references the element ID of the set element whose reception signals the end of an atomic update to this set. This elementID must be used in conjunction with the updateElementTimestamp below to fully identify when the atomic update has completed and the set is stable. |
| updateElementTimestamp† | DateTime            | This field identifies the elementTimestamp of the element, referenced above by updateElementID, that signals the end of an atomic update to this set. This field will be empty in the event that the element update results from a DDS dispose.                                         |
| size                    | LargeCollectionSize | Indicates the number of elements associated with this set after the atomic update is complete.                                                                                                                                                                                          |

An example element type is shown below, where a FooReportType message has a Large Set attribute called "items" whose type is BarType

**Table 5:** Example FooReportTypeItemsSetElement Structure Definition

| Attribute Name   | Attribute Type | Attribute Description                                                                                                         |
|------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------|
| element          | BarType        | The value of the set element.                                                                                                 |
| setID            | NumericGUID    | Identifies the Large Set instance this element relates to.                                                                    |
| elementID*       | NumericGUID    | Uniquely identifies this element within the set and across all large collection elements that currently exist on the DDS bus. |
| elementTimestamp | DateTime       | The timestamp of this element.                                                                                                |

### 3.8.5 Large List Types

The following details the LargeListMetadata structure:

**Table 6:** LargeListMetadata Structure Definition

| Attribute Name          | Attribute Type      | Attribute Description                                                                                                                                                                                                                                                                      |
|-------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| listID                  | NumericGUID         | Identifies the Large List instance this metadata relates to.                                                                                                                                                                                                                               |
| updateElementID         | NumericGUID         | This field references the element ID of the list element whose reception signals the end of an atomic update to this list. This elementID must be used in conjunction with the updateElementTimestamp below to fully identify when the atomic update has completed and the list is stable. |
| updateElementTimestamp† | DateTime            | This field identifies the elementTimestamp of the element, referenced above by updateElementID, that signals the end of an atomic update to this list. This field will be empty in the event that the element update results from a DDS dispose.                                           |
| startingElementID       | NumericGUID         | This field identifies the list element, tying to its elementID, that is sequentially first in the list. This is provided for convenience when iterating through the linked list using the nextElementID field.                                                                             |
| size                    | LargeCollectionSize | Indicates the number of elements associated with this set after the atomic update is complete.                                                                                                                                                                                             |

An example element type is shown below, where a **FooReportType** message has a Large List attribute called "items" whose type is **BarType**

**Table 7:** Example FooReportTypeItemsListElement Structure Definition

| Attribute Name   | Attribute Type | Attribute Description                                                                                                                                             |
|------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| element          | BarType        | The value of the list element.                                                                                                                                    |
| listID           | NumericGUID    | Identifies the Large List instance this element relates to.                                                                                                       |
| elementID*       | NumericGUID    | Uniquely identifies this element within the list and across all large collection elements that currently exist on the DDS bus.                                    |
| elementTimestamp | DateTime       | The timestamp of this element.                                                                                                                                    |
| nextElementID†   | NumericGUID    | This field references to the elementID of the element that logically follows this element in the linked list. This is empty if this element is sequentially last. |

## 4 Introduction to Coordinate Reference Frames and Position Model

### 4.1 Vehicle Reference Frame

In the following Service Definitions, we use the parameters yaw, pitch, and roll to define the vehicle orientation with respect to the specified reference frame. Each parameter is described as a rotation around a given axis: Yaw about the Z axis. Pitch about the Y axis. Roll about the X axis. A UUV is shown in the diagrams because it has more degrees for freedom for its pose and motion, however, the terminology equally applies to both USVs and UUVs.

The axes are defined as:

- X - Positive in the forward direction, negative in the aft.
- Y - Positive in the starboard direction, negative in the port.
- Z - Positive in the down direction, negative in the up.

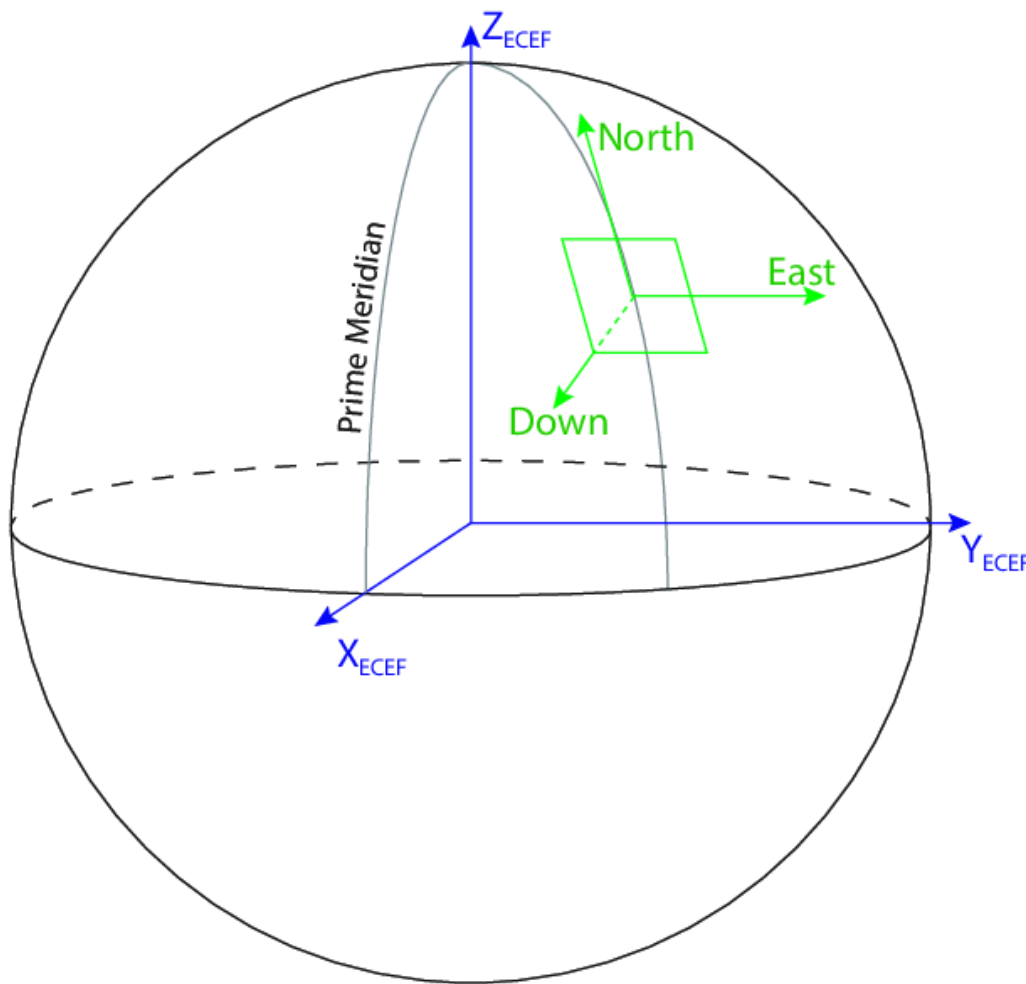
Additionally, rotations about all axes follow the right-hand rule.

### 4.2 Earth-Centered Earth-Fixed Frame

The Earth-Centered Earth-Fixed (ECEF) frame is a global reference frame with its origin at the center of the ellipsoid modeling the Earth's surface (Figure 4). The Z-axis points along the Earth's axis of rotation through the North Pole. The X-axis points from the origin to the intersection of the equator with the prime meridian, which defines 0° longitude. The Y-axis completes the right-handed orthogonal system, intersecting the equator at the 90° east meridian.

### 4.3 North-East-Down Frame

The North-East-Down (NED) frame is defined with an origin at the object described by the navigation solution. The Down axis is defined as normal to the surface of the reference ellipsoid in the direction pointing towards the interior of the Earth. The North axis is the projection of the line from the object to the north pole onto the plane orthogonal to the Down axis. The East axis completes the right-handed orthogonal system and points in the East direction.



**Figure 4:** Origins and axes of the Earth-Centered Earth-Fixed (ECEF) and North-East-Down (NED) frames.

#### 4.4 WGS 84

The World Geodetic System (WGS) 1984 defines a standard coordinate system for the Earth. It represents the Earth as an oblate spheroid, and defines the mapping between latitude-longitude-altitude (LLA) coordinates and Cartesian ECEF coordinates. GPS reports positions in WGS 84 LLA coordinates. It has become the standard datum for navigation.

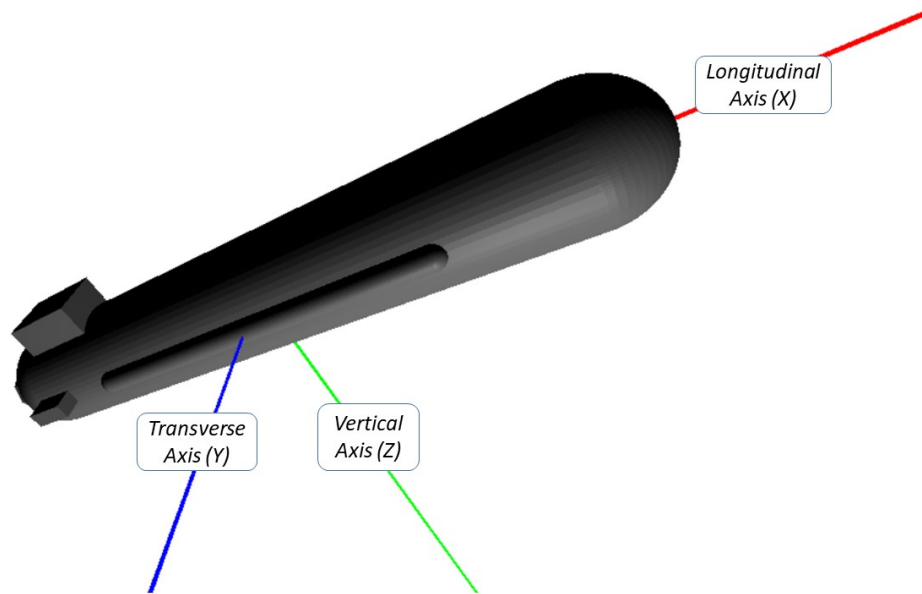
While the UMAA services typically make use of the coordinate systems defined by WGS 84, it also defines an Earth Gravity Model (EGM) and a World Magnetic Model (WMM) which are updated regularly.

#### 4.5 Vehicle Orientation

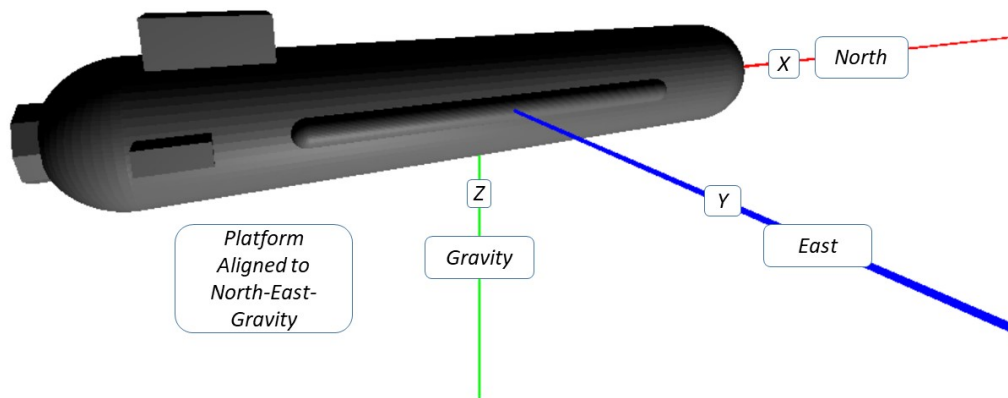
Determining the orientation of the vehicle (Figure 5) with respect to any reference frame is carried out via the following procedure (Figure 6).

1. Align the vehicle's longitudinal or X axis with the reference frame X axis. In the global reference frame, this is the north direction.
2. Align the vehicle's down or Z axis with the reference frame's Z axis. In the global reference frame, this is the gravity direction.
3. Ensure that the vehicle's transverse or Y axis is aligned with the reference frame's Y axis. In the global reference frame, this is the east direction.
4. Rotate the vehicle about the vehicle's Z axis by the yaw angle (Figure 7).
5. Rotate the vehicle about the vehicle's newly oriented Y axis by the pitch angle (Figure 8).

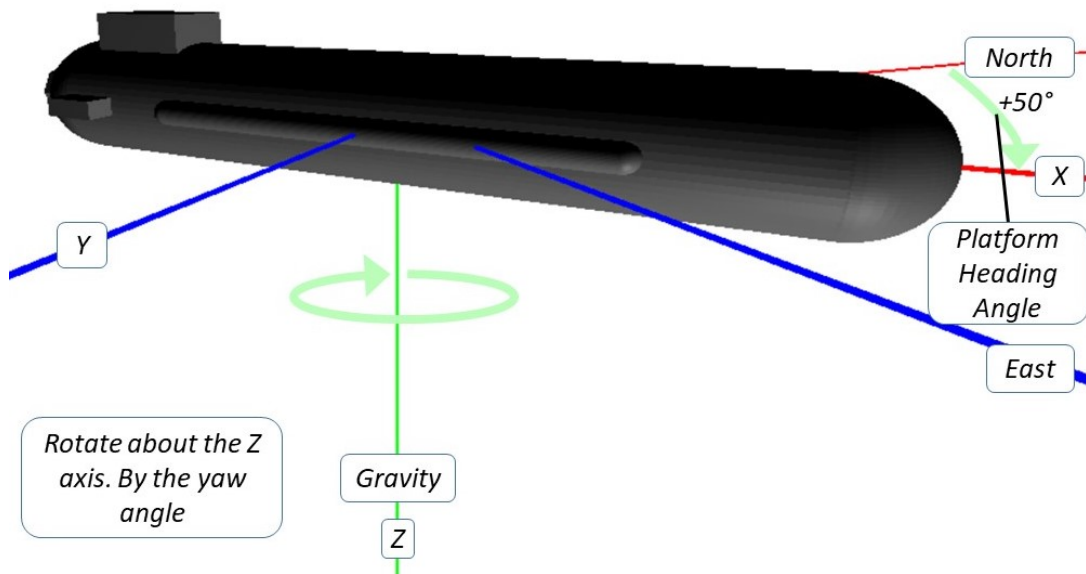
6. Rotate the vehicle about the vehicle's newly oriented X axis by the roll angle (Figure 9).



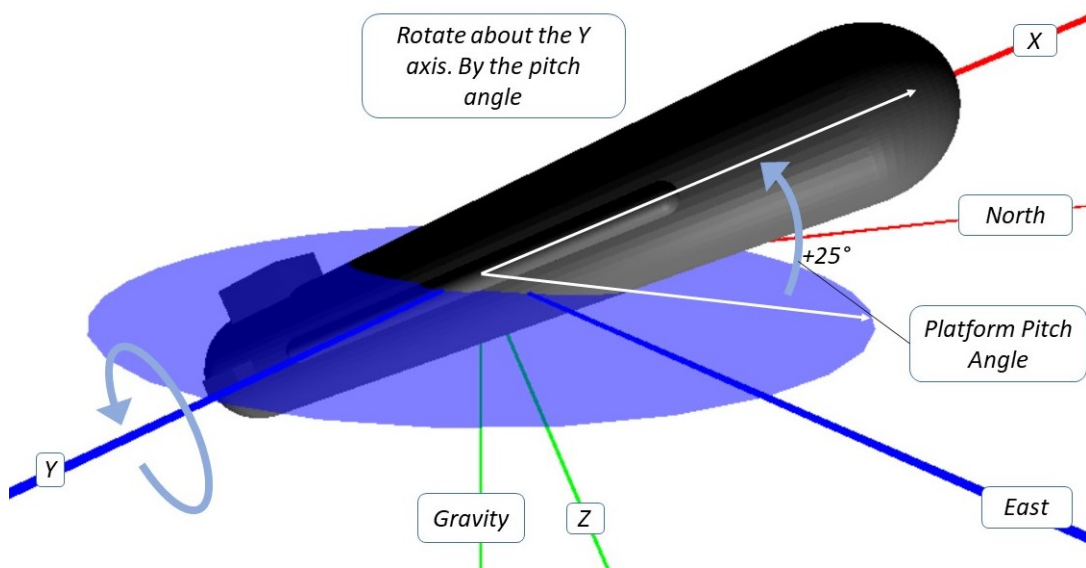
**Figure 5:** Define the Vehicle Coordinate System



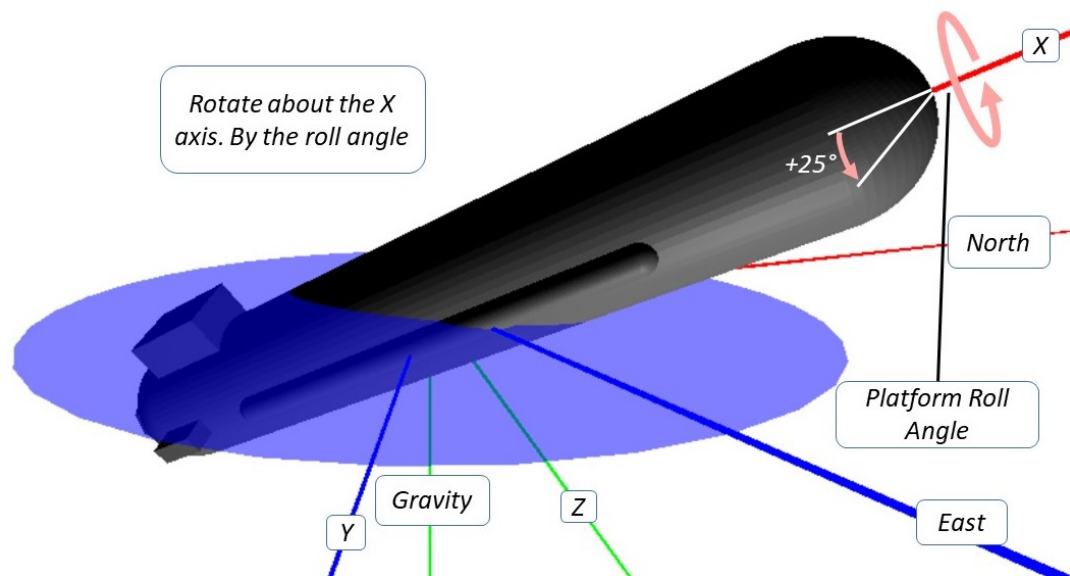
**Figure 6:** Align the Vehicle with the Reference Frame Axes.



**Figure 7:** Rotate the Vehicle by the Yaw Angle.



**Figure 8:** Rotate the Vehicle by the Pitch Angle.



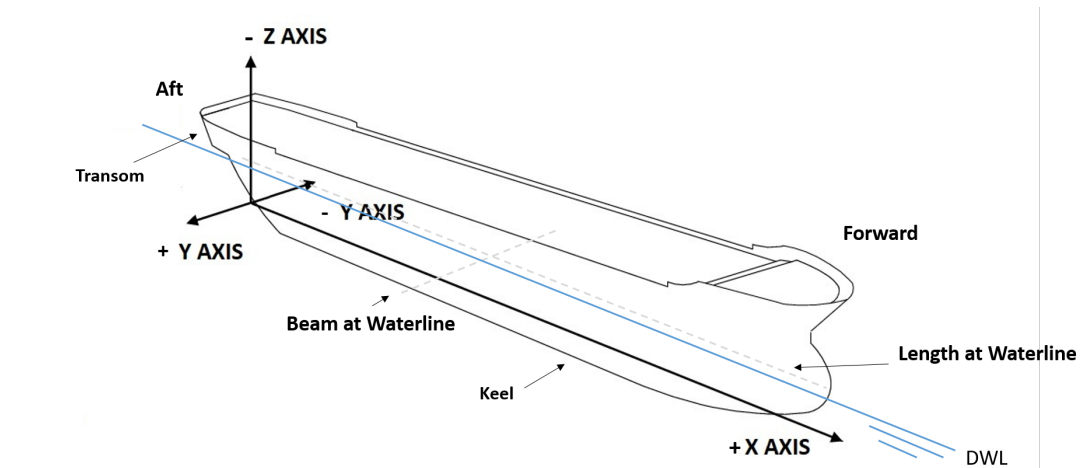
**Figure 9:** Rotate the Vehicle by the Roll Angle.

#### 4.6 Vehicle Coordinate Reference Frame Origin

UMAA does not specify a required origin for the vehicle coordinate reference frame. However, certain applications may benefit from defining a specific origin such as the registration of multiple sensors with associated offsets for data fusion. Possible origins include the keel/transom intersection, bow/waterline intersection, center of gravity, center of buoyancy and location of INS. A few examples follow.

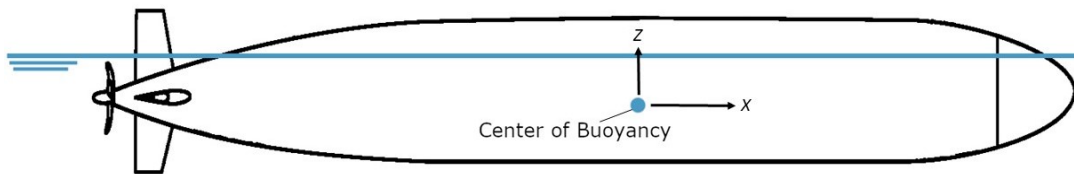
##### Definitions

- Keel Transom Intersection
  - Beam at Waterline (BWL) - The maximum distance of the vehicle at the waterline, the distance along the Y axis of the widest point of the hull where it meets the waterline.
  - Design Waterline (DWL) - The line representing the waterline on the vehicle at designed load in summer temperature.
  - Keel - The principal fore-and-aft component of a ship's framing, located along the centerline of the bottom and connected to the stem and stern frames.
  - Length at Waterline (LWL) - The measured distance of the vehicle at the level where it sits in the water, measured along the X axis.
  - Transom - The aftermost transverse flat or shaped plating enclosing the hull.



**Figure 10:** Keel Transom Intersection Origin Location on a USV as Example

- Center of Buoyancy
  - X - The Longitudinal Center of Buoyancy (LCB) when fully submerged.
  - Y - The symmetrical centerline.
  - Z - The Vertical Center of Buoyancy (VCB) when fully submerged.



**Figure 11:** Center of Buoyancy Origin Location on a UUV as Example.

## 5 Flow Control

### 5.1 Command / Response

This section defines the flow of control for command/response over the DDS bus. A command/response controls a specific service. While the exact names and processes will depend on the specific service and command being executed, all command/responses in UMAA follow a similar pattern. A notional "Function" command **FunctionCommand** is used in the following examples. As will be described in subsequent paragraphs, DDS publish/subscribe methods are used in implementations to issue commands and responses.

To direct a **FunctionCommand** at a specific Service Provider, UMAA includes a **destination** GUID in all commands. A Service Provider is required to respond to all **FunctionCommands** where the **destination** is the same as the Service Provider's ID. The Service Consumer will also create a **sessionID** for the command when commanded. The **sessionID** is used to track the command execution as a key into other command-related messages. The **sessionID** must be unique across all **FunctionCommand** instances that are active (i.e. currently on the DDS bus), otherwise the Service Provider will consider the **FunctionCommand** to be a command update (see Section 5.1.4.2). Once a **FunctionCommand** is removed from the DDS bus as part of the Command Cleanup process (see Section 5.1.5), its **sessionID** may be reused for future commands without triggering a command update; therefore it is not necessary for a Service Provider to maintain a complete history of **sessionIDs**.

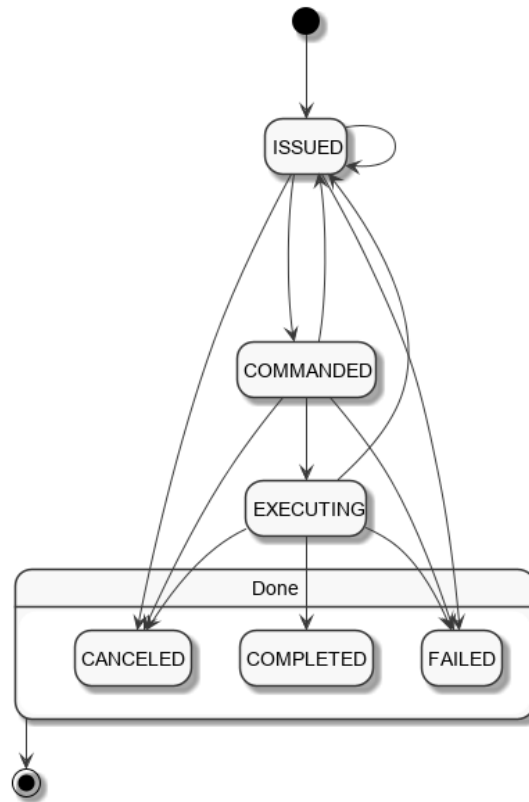
Service Provider and Service Consumer terminology in the following sections is adopted from the OMG Service-oriented architecture Modeling Language (SoaML).

To initialize, a Service Provider (controllable resource) subscribes to the **FunctionCommand** DDS topic. At startup or right before issuing a command, the Service Consumer (controlling resource) subscribes to the **FunctionCommandStatus** DDS topic. Optionally, the Service Consumer may also subscribe to the **FunctionCommandAckReport** to monitor which command is currently being executed, and the **FunctionExecutionStatusReport** (if defined for the Function service) that provides reporting on function-specific data status.

Both Service Providers and Service Consumers are required to recover or clean up any previous persisted commands on the bus during initialization.

To execute a command, the Service Consumer publishes a **FunctionCommandType** to the DDS bus. The Service Provider will be notified and will begin processing the request. During each phase of processing, the Service Provider will provide updates to the Service Consumer via published updates to a related **FunctionCommandStatus** topic. Command responses are correlated to their originating command via the **sessionID**. If a command with a duplicate **sessionID** is received, the Service Provider will regard this as a command update, and follow the flow control detailed in Section 5.1.4.2. Command status updates are provided in the command responses via the **commandStatus** field with additional details included in the **commandStatusReason** field. The Service Provider will also publish the current executing command to the **FunctionCommandAckReport** topic. When defined for the Function service, the Service Provider must also publish the **FunctionExecutionStatusReport** topic and update it as appropriate throughout the execution of the command.

The required state transitions for the **commandStatus** field are shown in Figure 12. Commands may complete normally, or they may terminate early due to failure (Section 5.1.4.4) or cancellation (Section 5.1.4.5). The state machine for a command can also be reset to **ISSUED** via a command update (Section 5.1.4.2). If there is not a self-transition indicated in the diagram, you cannot republish that state in a message. Every command must transition through the states as defined. For example, it is a violation to transition from **ISSUED** to **EXECUTING** without transitioning through **COMMANDED**. Even in the case where there is no logic executing between the **ISSUED** and **EXECUTING** states, the Service Provider is required to transition through **COMMANDED**. This ensures consistent behavior across different Service Providers, including those that do require the **COMMANDED** state.



**Figure 12:** State transitions of the `commandStatus` as commands are processed.

As described above, each time a command transitions to a new state, a `FunctionCommandStatus` message is published containing the updated `commandStatus` and a `commandStatusReason` that indicates why the state transition happened. The table below shows all valid `commandStatusReason` values for each `commandStatus` transition.

| Starting State | Ending State |           |           |           |                                                                                  |          |
|----------------|--------------|-----------|-----------|-----------|----------------------------------------------------------------------------------|----------|
|                | ISSUED       | COMMANDED | EXECUTING | COMPLETED | FAILED                                                                           | CANCELED |
| Initial State  | SUCCEEDED    | —         | —         | —         | —                                                                                | —        |
| ISSUED         | UPDATED      | SUCCEEDED | —         | —         | VALIDATION_FAILED<br>RESOURCE_FAILED<br>INTERRUPTED<br>TIMEOUT<br>SERVICE_FAILED | CANCELED |
| COMMANDED      | UPDATED      | —         | SUCCEEDED | —         | RESOURCE_REJECTED<br>INTERRUPTED<br>TIMEOUT<br>SERVICE_FAILED                    | CANCELED |
| EXECUTING      | UPDATED      | —         | —         | SUCCEEDED | OBJECTIVE_FAILED<br>RESOURCE_FAILED<br>INTERRUPTED<br>TIMEOUT<br>SERVICE_FAILED  | CANCELED |
| COMPLETED      | —            | —         | —         | —         | —                                                                                | —        |
| FAILED         | —            | —         | —         | —         | —                                                                                | —        |
| CANCELED       | —            | —         | —         | —         | —                                                                                | —        |

**Figure 13:** Valid `commandStatusReason` values for each `commandStatus` state transition. Entries marked with a (—) indicate that the state transition is invalid.

In the following sections, the sequence diagrams demonstrate different exchanges between a Service Consumer and Service

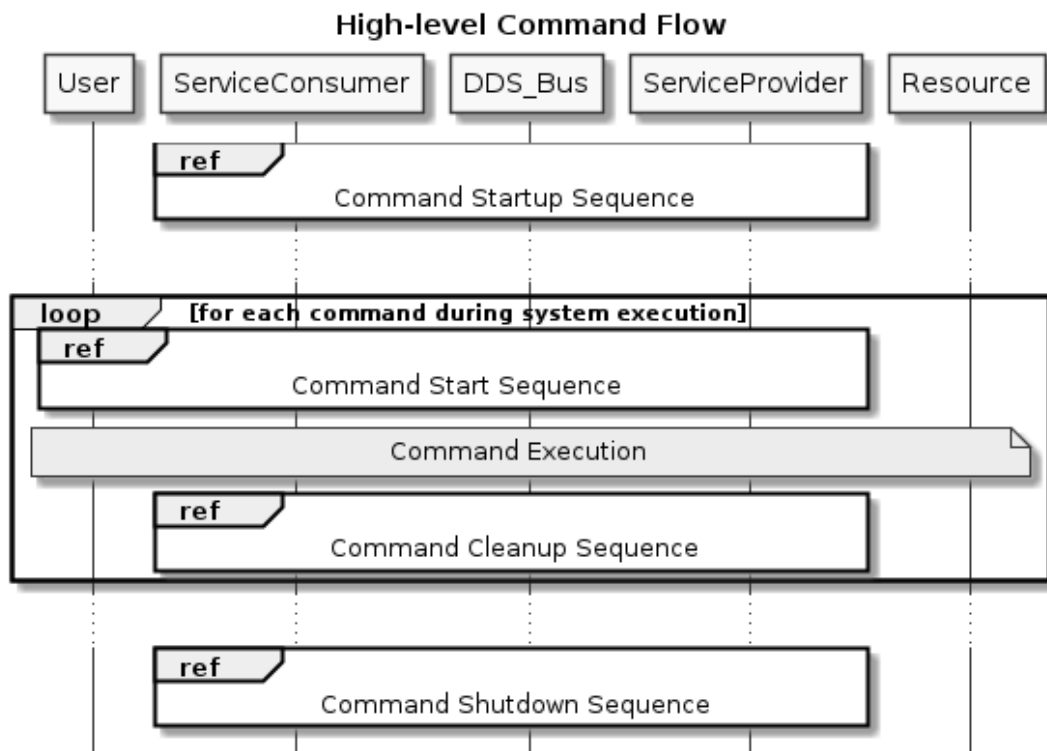
Provider. Within the diagrams, the dashed arrows represent implementation-specific communications that are outside of UMAA's scope. These sequence diagrams are just an example of one possible implementation. Other implementations may have different communication patterns between the Service Provider and the Resource or be implemented completely within the Service Provider process itself (no dependency on an external Resource). Likewise, the interactions between the User and Service Consumer may follow similar or different patterns. However, the UMAA-defined exchanges with the DDS bus between the Service Consumer and Service Provider must happen in the order shown within the sequence diagrams.

### 5.1.1 High-Level Flow

The high-level flow of a command sequence is shown in Figure 14 and can be described as follows:

1. The Command Startup Sequence is performed.
2. For each command to be executed:
  - (a) The Command Start Sequence is performed.
  - (b) The command is executed (sequence depends on the execution path, i.e., success, failure, or cancel).
  - (c) The Command Cleanup Sequence is performed.
3. The Command Shutdown Sequence is performed.

The **ref** blocks will be defined in later sequence diagrams. Note that the duration of the system execution for any particular **FunctionCommandType** is defined by the combination of the Service Provider(s) and Service Consumer(s) in the system and may not be identical to the overall system execution duration. For example, providers may only be available to execute certain commands during specific mission phases or when certain hardware is in specific configurations. This Command Startup Sequence is not required to happen during a system startup phase. The only requirement is that it must be completed by at least one Service Provider and one Service Consumer before any **FunctionCommandType** commands can be fully executed. Likewise, the Command Shutdown sequence may occur at any time the **FunctionCommandType** will no longer be supported. There is no requirement stating that the Command Shutdown Sequence only be performed during a system shutdown phase.

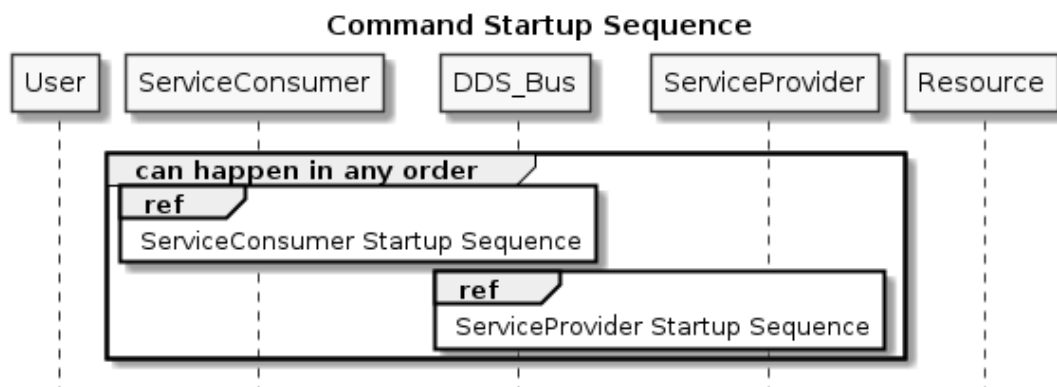


**Figure 14:** Sequence Diagram for the High-Level Description of a Command Execution.

### 5.1.2 Command Startup Sequence

As part of initialization both the Service Provider and Service Consumer are required to perform a startup sequence. This startup prepares the Service Provider to execute commands and the Service Consumer to request commands and monitor the progress of those requested commands.

The Service Provider and Service Consumer can initialize in any order. Commands will not be completely executed until both have completed their initialization. The sequence diagram is shown in Figure 15.



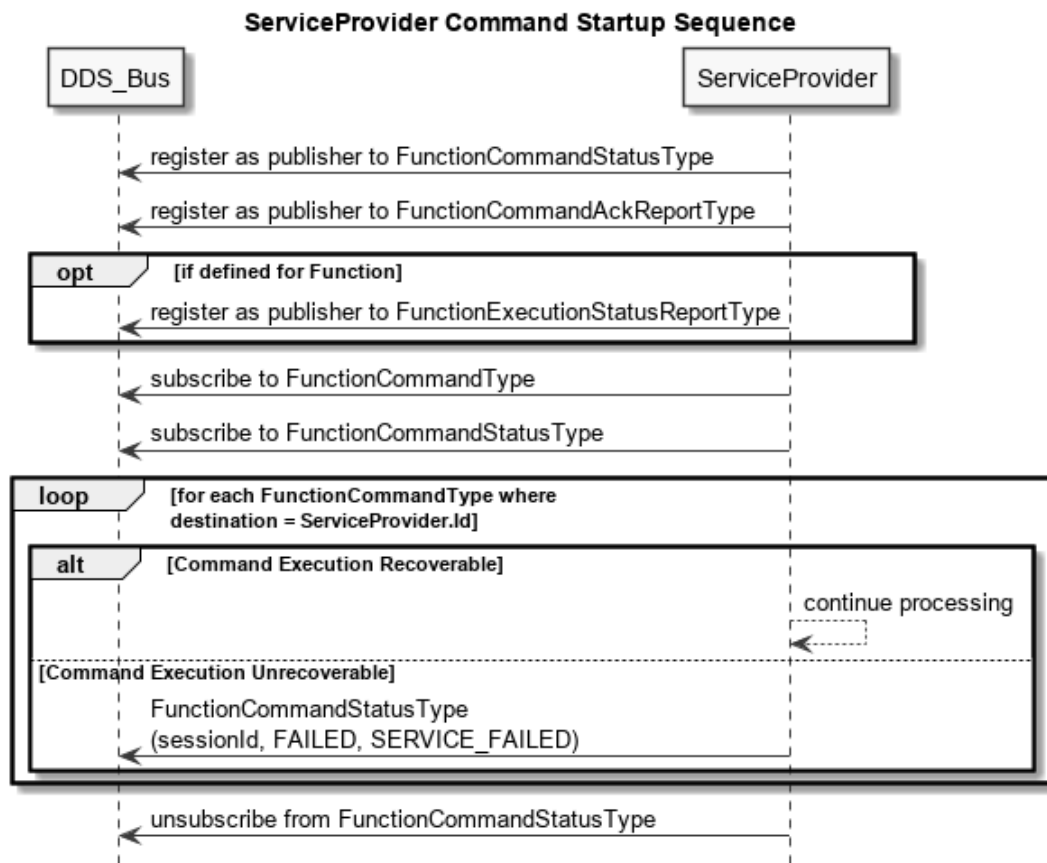
**Figure 15:** Sequence Diagram for Command Startup.

**5.1.2.1 Service Provider Startup Sequence** During startup, the Service Provider is required to register as a publisher to the `FunctionCommandStatus`, `FunctionCommandAckReport`, and (if defined for the Function service) the `FunctionExecutionStatusReport` topics.

The Service Provider is also required to subscribe to the `FunctionCommand` topic to be notified when new commands are published.

Finally, the Service Provider is required to handle any existing `FunctionCommandType` commands persisted on the DDS bus with the Service Provider's ID. For each command, if the Service Provider can and wishes to recover, it can continue to execute the command. To obtain the last published state of the command, the Service Provider must subscribe to the `FunctionCommandStatusType`. The Service Provider will continue following the normal status update sequence, picking up from the last status on the bus. If the Service Provider cannot or chooses not to continue processing the command, it must fail the command by publishing a `FunctionCommandStatus` with a `commandStatus` of `FAILED` and a `reason` of `SERVICE_FAILED`.

The Service Provider Startup sequence is shown in Figure 16.



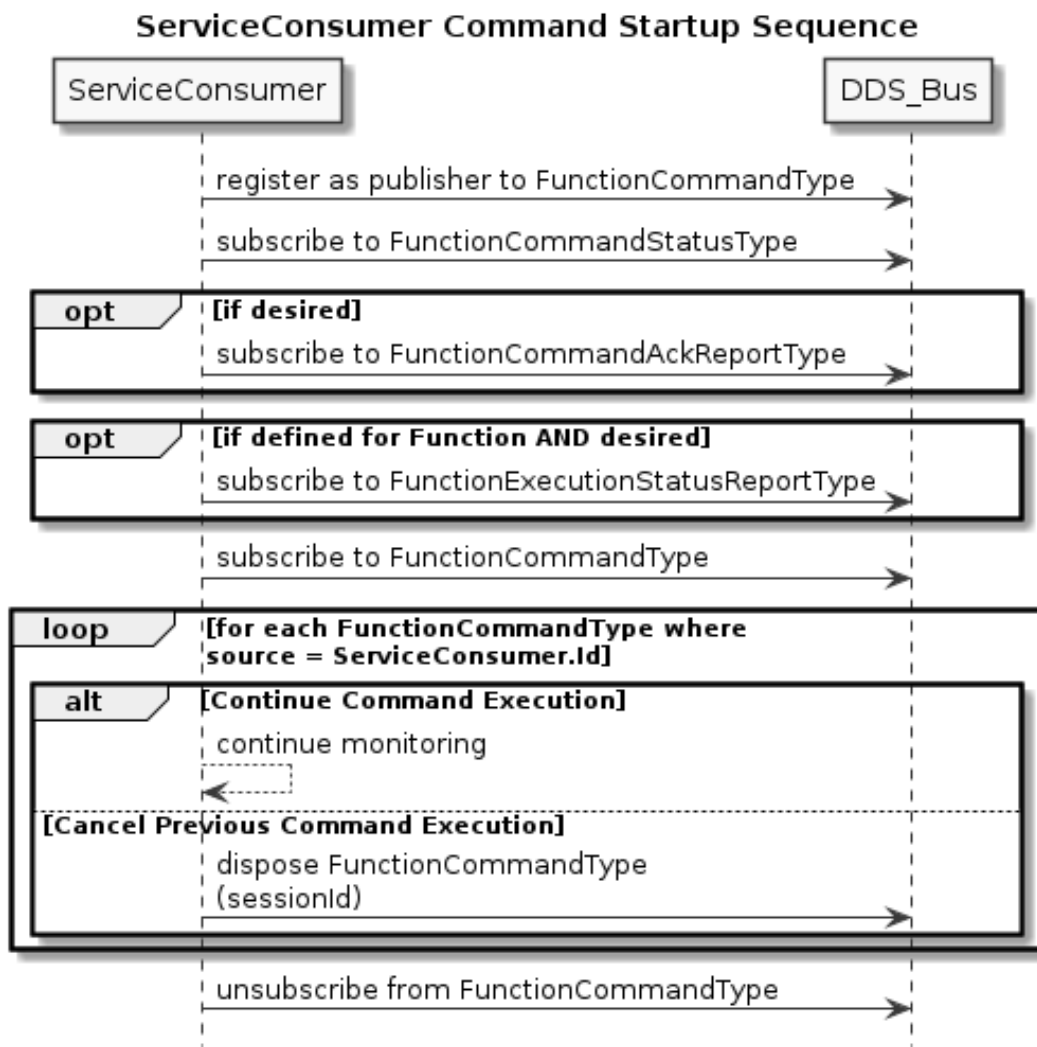
**Figure 16:** Sequence Diagram for Command Startup for Service Providers.

**5.1.2.2 Service Consumer Startup Sequence** During startup, the Service Consumer is required to register as a publisher of the **FunctionCommandType**.

The Service Consumer is also required to subscribe to the **FunctionCommandStatusType** to monitor the execution of any published commands. The Service Consumer can optionally register for the **FunctionCommandAckReportType** and, if defined for the Function service, the **FunctionExecutionStatusReportType** if it desires to track additional status of the execution of commands.

Finally, the Service Consumer is required to handle any existing **FunctionCommandType** commands persisted on the DDS bus with this Service Consumer's ID. To find existing **FunctionCommandTypes** on the bus, it must first subscribe to the topic. If the Service Consumer can and wishes to recover, it can continue to monitor the execution of the command. If the Service Consumer cannot or chooses not to continue the execution of the command, it must cancel the command via the normal command cancel method.

The Service Consumer Startup sequence is shown in Figure 17.



**Figure 17:** Sequence Diagram for Command Startup for Service Consumers.

### 5.1.3 Command Execution Sequences

Once both the Service Provider and Service Consumer have performed the startup sequence, the system is ready to begin issuing and executing commands.

### 5.1.4 Command Start Sequence

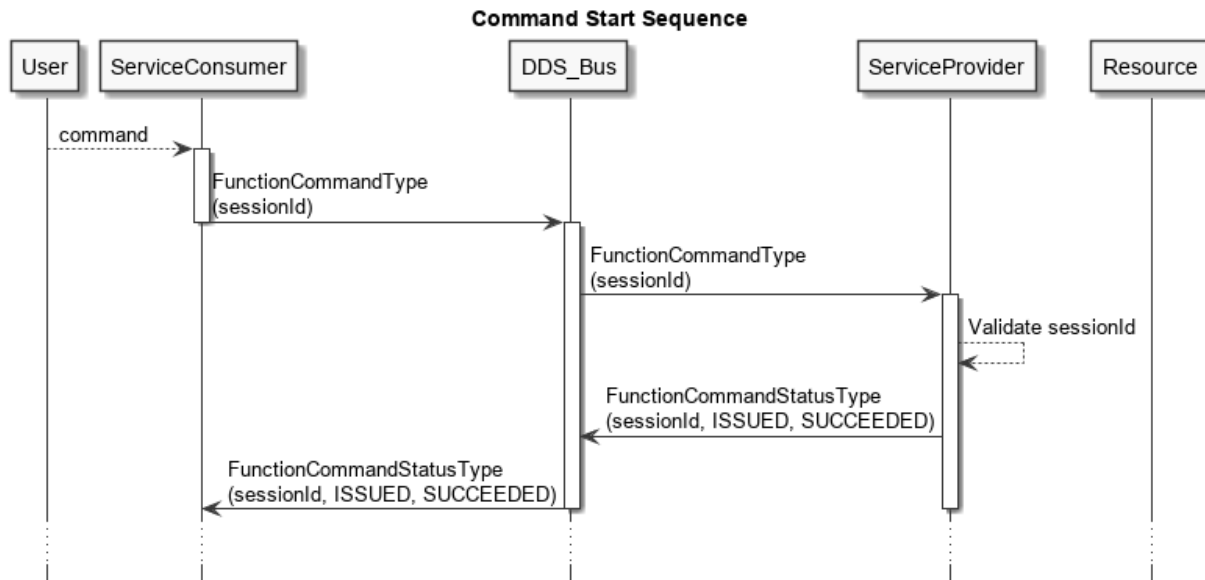
The initial start sequence to execute a single new command follows this pattern:

1. The User of the Service Consumer issues a request for a command to be executed.
2. The Service Consumer publishes the `FunctionCommandType` with a unique session ID, the source ID of the Service Consumer, and the destination ID of the desired Service Provider.
3. The Service Provider, upon notification of the new `FunctionCommandType`, publishes a new `FunctionCommandStatusType` with (1) the same session ID as the new `FunctionCommandType`, (2) the status of `ISSUED` and (3) the reason of `SUCCEEDED` to notify the Service Consumer it has received the new command.

The Command Start Sequence for a new command is shown in Figure 18. This pattern will be repeated each time a new command is requested. Note that the Command Start Sequence differs if the `FunctionCommandType` has a `sessionId` that matches another `FunctionCommandType` that currently exists on the DDS bus. This is considered a command update and detailed in Section 5.1.4.2.

After the Command Start Sequence, the sequence can take different paths depending on the actual execution of the command,

detailed from Section 5.1.4.1 to Section 5.1.4.5, but they do not enumerate all of the possible execution paths. Other paths (e.g., an objective failing) will follow a similar pattern to other failures; all are required to follow the state diagram shown in Figure 12 and eventually end with the Command Cleanup Sequence (shown in Figure 25).

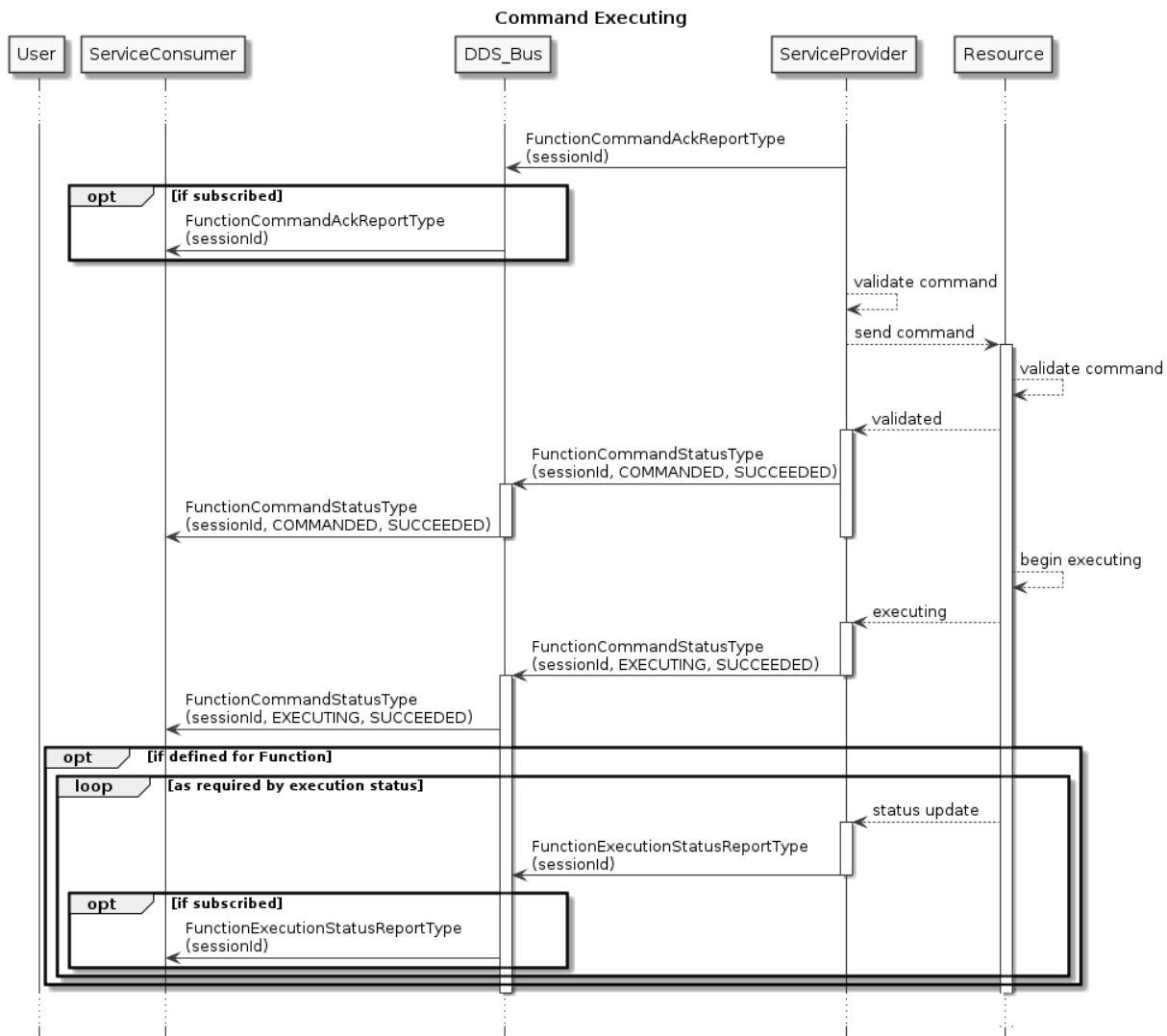


**Figure 18:** Sequence Diagram for the Start of a Command Execution.

**5.1.4.1 Command Execution** Once a Service Provider starts to process a command, the Command Execution sequence is:

1. The Service Provider publishes a **FunctionCommandAckReportType** with matching session ID and parameters as the **FunctionCommandType** it is starting to process.
2. The Service Provider performs any validation and negotiation with backing resources as necessary. Once the command is ready to be executed, the Service Provider publishes a **FunctionCommandStatusType** with a status **COMMANDED** and reason **SUCCEEDED** to notify the Service Consumer that the command has been validated and commanded to start execution.
3. Once the command has begun executing, the Service Provider publishes a **FunctionCommandStatusType** with a status **EXECUTING** and reason **SUCCEEDED** to notify the Service Consumer that the command has been validated and commanded to start.
4. If the Function has a defined **FunctionExecutionStatusReportType**, the Service Provider must publish a new instance with matching session ID as the associated **FunctionCommandType**. The **FunctionExecutionStatusReportType** must be updated by the Service Provider throughout the execution as dictated by the definitions of the command-specific attributes in the execution status report.

The command execution sequence is shown in Figure 19. This sequence holds until the command completes execution.



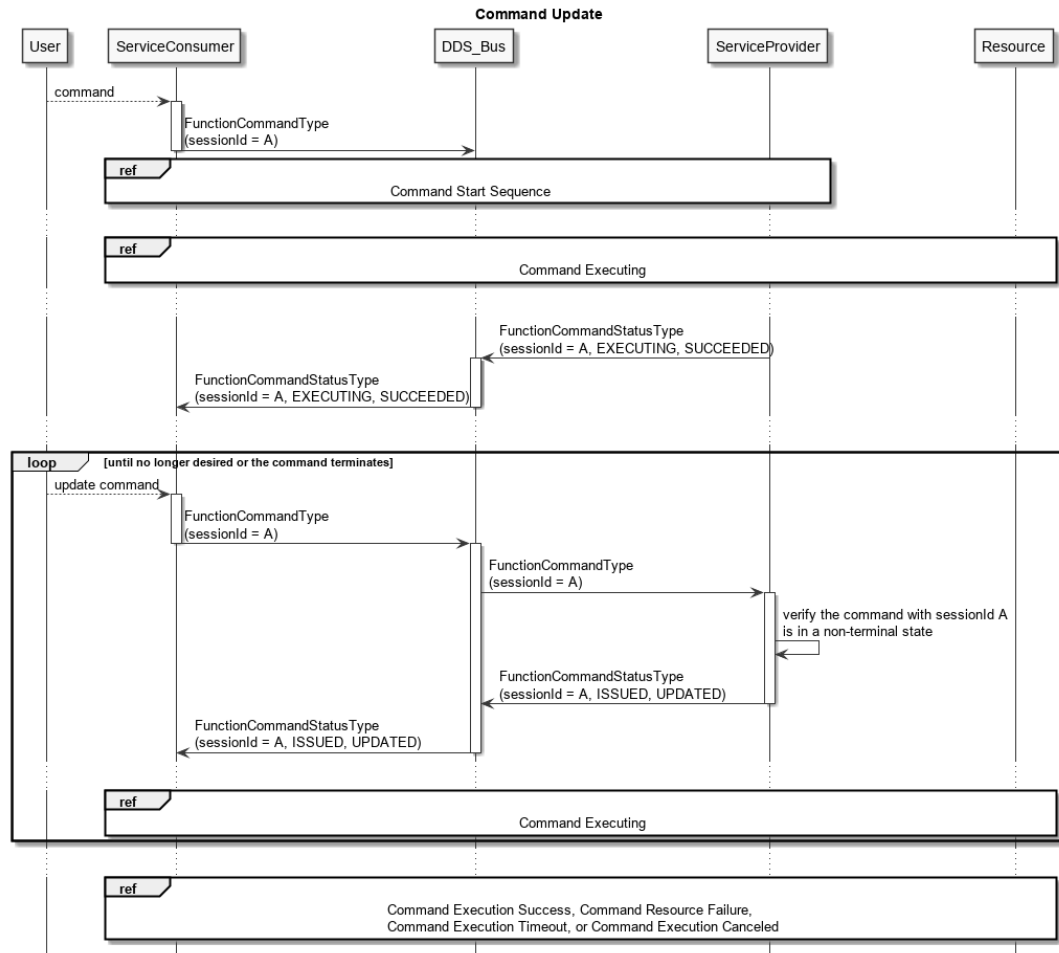
**Figure 19:** Beginning Sequence Diagram for a Command Execution.

The normal successful conclusion of a command being executed in some cases is initiated by the Service Consumer (an endless GlobalVector command concluded by canceling it) and in other cases is initiated by the Service Provider (a GlobalWaypoint commanded concluded by reaching the last waypoint). Unless otherwise explicitly stated, it is assumed the Service Provider will be able to identify the successful conclusion of a command. In the cases where commands are defined to be indeterminate the Service Consumer must cancel the command when the Service Consumer no longer desires the command to be executed.

**5.1.4.2 Updating a Command** An updated command is defined as a command with a source ID and session ID identical to the current command being processed by the Service Provider, but whose timestamp is newer than the current command. Only a command that is in a non-terminal state may be updated - otherwise, the Service Consumer must follow the normal command cleanup process and issue a new command with an updated unique session ID. When the Service Provider receives an updated command, it is required to take one of two possible actions:

1. If the current command is in a non-terminal state (ISSUED, COMMANDED, or EXECUTING), then the Service Provider publishes a **FunctionCommandStatusType** with a status ISSUED and reason UPDATED. The state machine then restarts and proceeds through the normal command flow detailed in 5.1.4. The Service Provider must consider the updated command as an entirely new command, resetting any internal state related to the command (e.g. a timer that keeps track of command timeout).
2. If the current command is in a terminal state (COMPLETED, CANCELED, or FAILED), then the updated command cannot be processed, and the Service Provider must publish a **FunctionCommandStatusType** with a status FAILED and follow the normal command cleanup process.

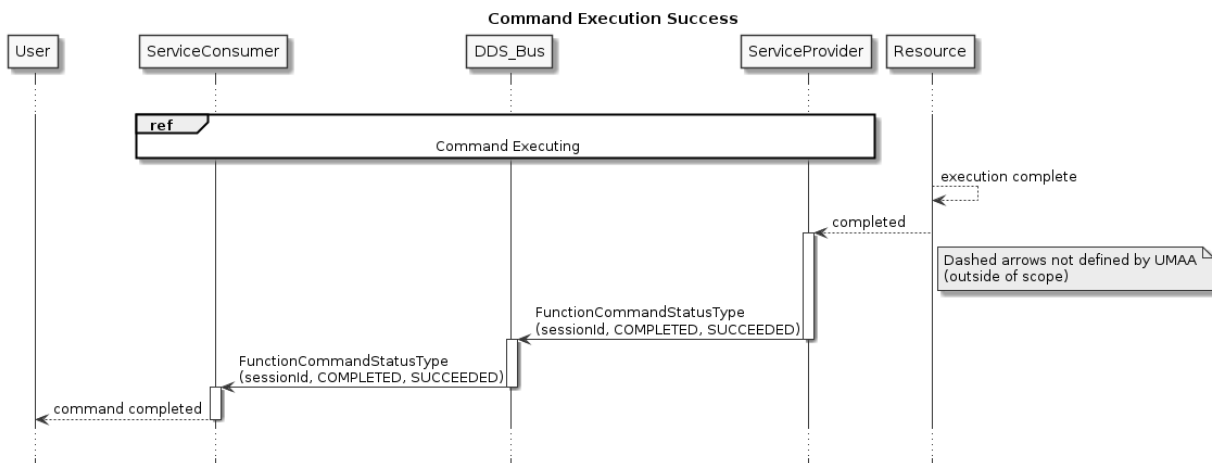
The flow control for command update is detailed below:



**Figure 20:** Sequence Diagram for Command Update.

**5.1.4.3 Command Execution Success** When the Service Provider determines a command has successfully completed, it must update the associated **FunctionCommandStatusType** with as status of **COMPLETED** and reason of **SUCCEEDED**. This signals to the Service Consumer that the command has completed successfully.

The Command Execution Success sequence is shown in Figure 21.

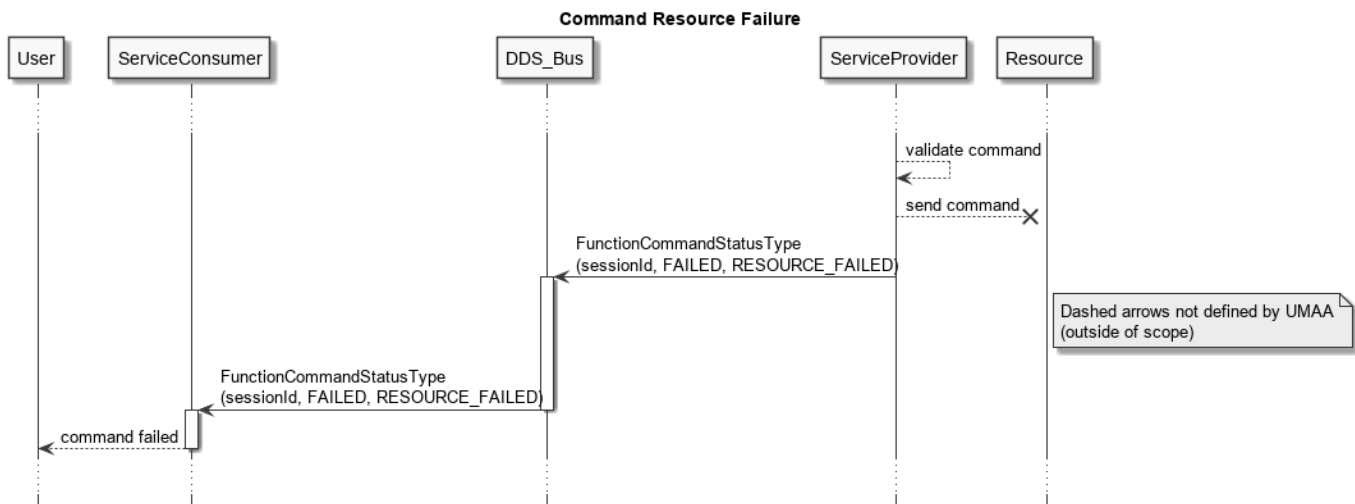


**Figure 21:** Sequence Diagram for a Command That Completes Successfully.

**5.1.4.4 Command Execution Failure** The command may fail to complete for any number of reasons including software errors, hardware failures, or unfavorable environmental conditions. The Service Provider may also reject a command for a number of reasons including inability to perform the task, malformed or out of range requests, or a command being interrupted by a higher priority process. In all cases, the Service Provider must publish a **FunctionCommandStatusType** with an identical **sessionId** as the originating **FunctionCommandType** with a status of **FAILED** and the reason that reflects the cause of the failure (**VALIDATION\_FAILED**, **SERVICE\_FAILED**, **OBJECTIVE\_FAILED**, etc).

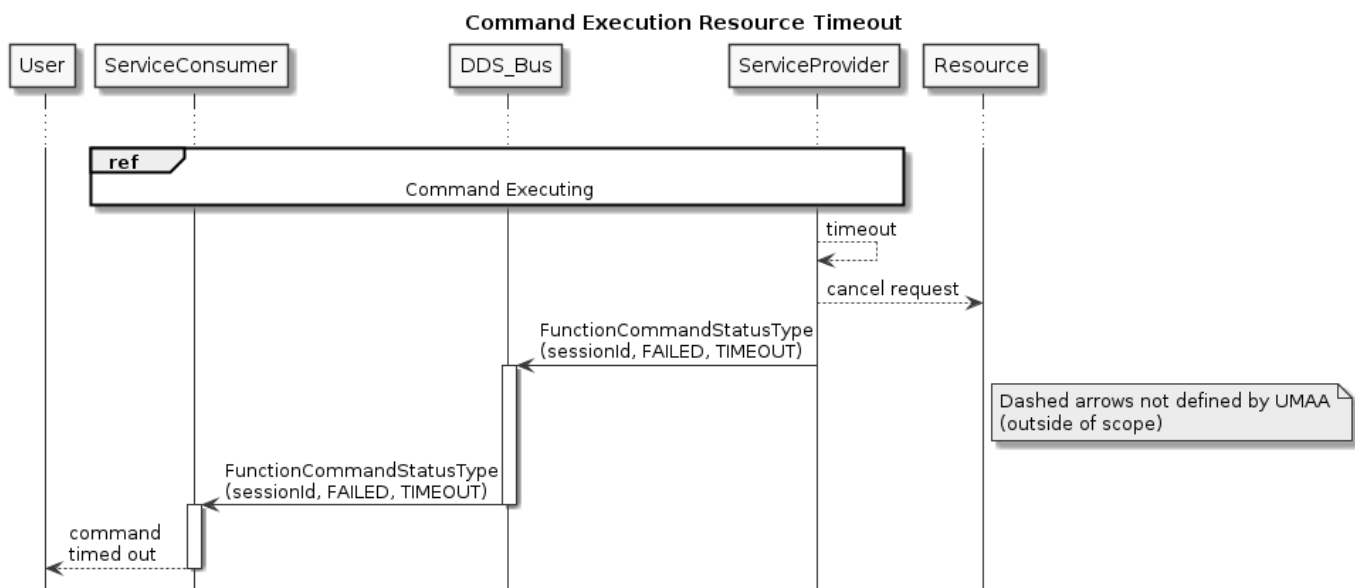
Figure 22 and Figure 23 provide examples where a command has failed.

In the first example, the backing Resource failed and the Service Provider is unable to communicate with it. In this case, the Service Provider will report a **FunctionCommandStatusType** with a status of **FAILED** and a reason of **RESOURCE\_FAILED**. This is shown in Figure 22.



**Figure 22:** Sequence Diagram for a Command That Fails due to Resource Failure.

In the second example, the Resource takes too long to respond, so the Service Provider cancels the request and reports a **FunctionCommandStatusType** with a status of **FAILED** and a reason of **TIMEOUT**. This is shown in Figure 23.



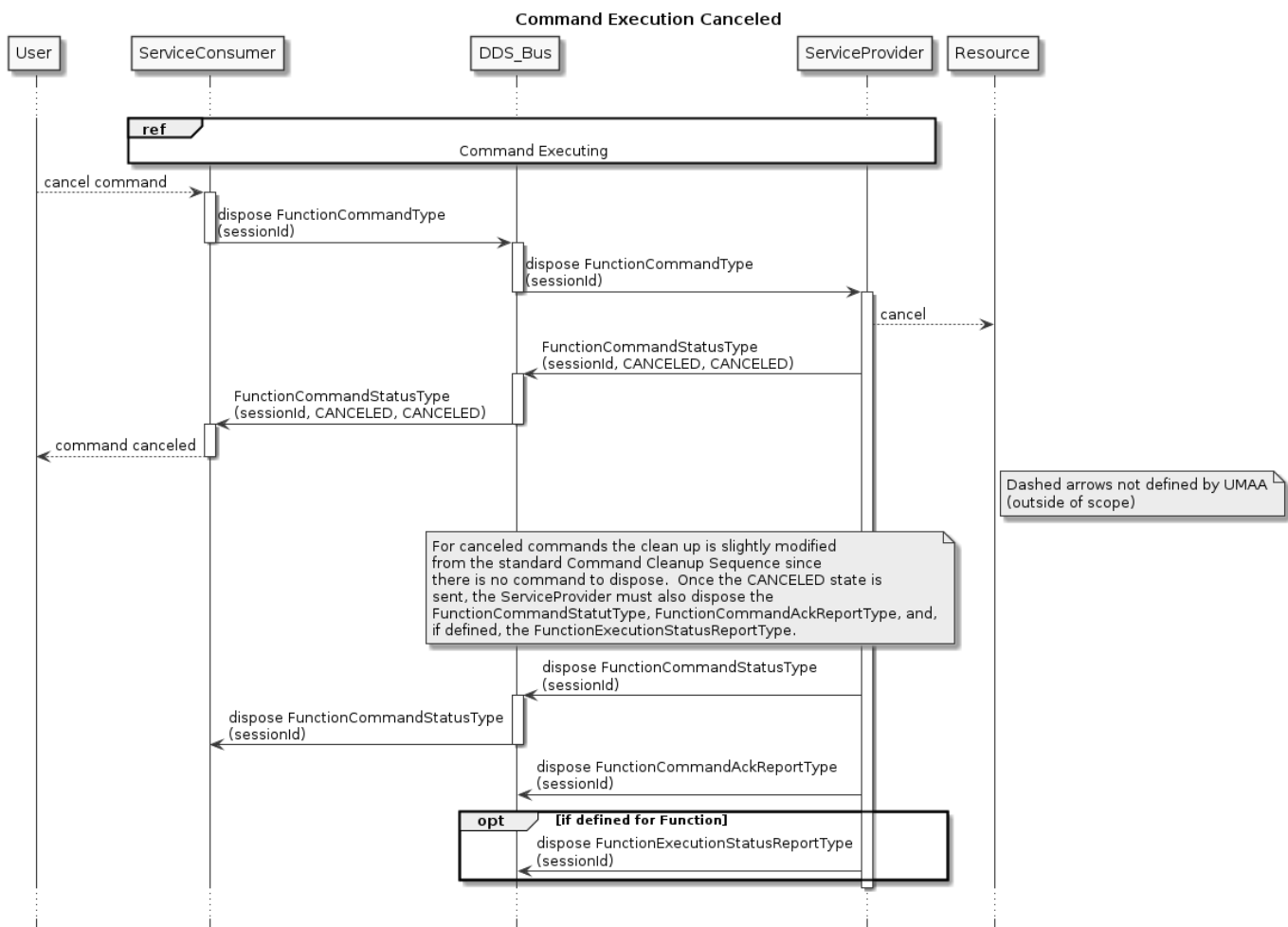
**Figure 23:** Sequence Diagram for a Command That Times Out Before Completing.

Other failure conditions will follow a similar pattern: when the failure is recognized, the Service Provider will publish a

**FunctionCommandStatusType** with a status of **FAILED** and a reason that reflect the cause of the failure.

**5.1.4.5 Command Canceled** The Service Consumer may decide to cancel the command before processing is finished. To signal a desire to cancel a command, the Service Consumer disposes of the existing **FunctionCommandType** from the DDS bus before the execution is complete. When notified of the command disposal, and if the Service Provider is able to cancel the command, it should respond to the Service Consumer with a **FunctionCommandStatusType** with both the status and reason as **CANCELED**. At this point, the DDS bus should dispose of the **FunctionCommandStatusType**, the **FunctionCommandAckReportType** and, (if defined for the Function service) the **FunctionExecutionStatusReportType**. This is shown in Figure 24. If the command cannot be canceled, then the Service Provider can continue to update the command status until the execution is completed. Reporting will include **FunctionCommandStatusType** with a status of **COMPLETED** and a reason of **SUCCEEDED**. Then, the DDS bus should dispose of the **FunctionCommandStatusType**, the **FunctionCommandAckReportType**, and (if defined for the Function service) the **FunctionExecutionStatusReportType**.

There is no new, unique, or specific status message response to a cancel command from the Service Provider. The cancel command status can be inferred through the corresponding **FunctionCommandStatusType** status and reason updates.



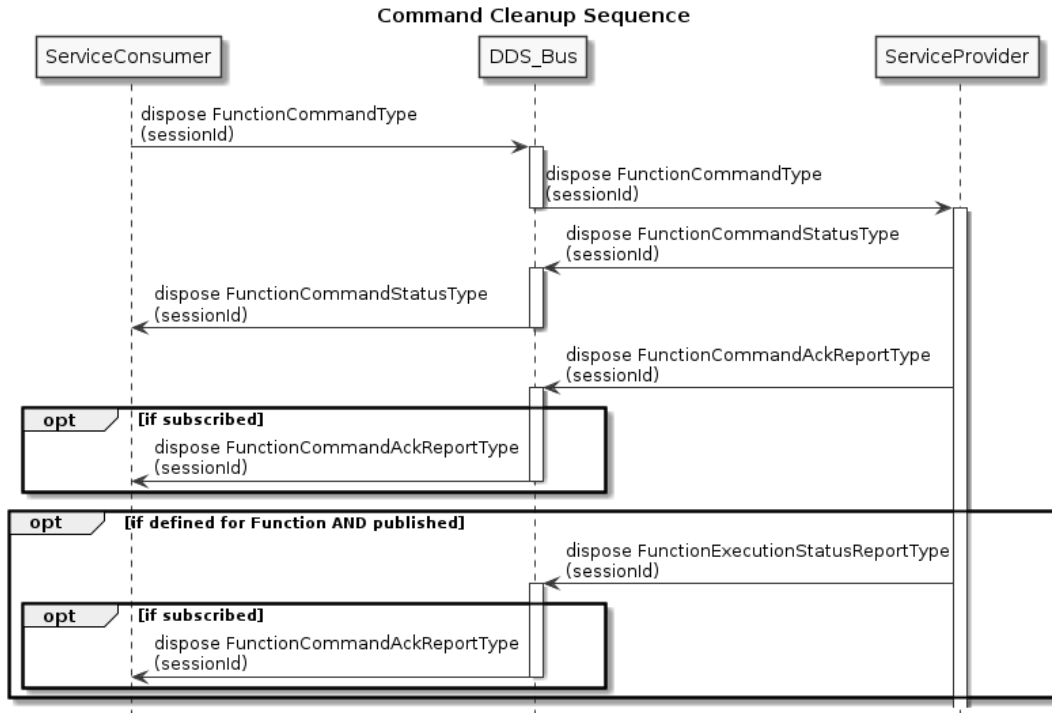
**Figure 24:** Sequence Diagram for a Command That is Canceled by the Service Consumer Before the Service Provider can Complete It.

### 5.1.5 Command Cleanup

The Service Consumer and Service Provider are responsible for disposing of corresponding data that is published to the DDS bus when the command is no longer active. With the exception of a canceled command, the signal that a **FunctionCommandType** can be disposed is when the **FunctionCommandStatusType** reports a terminal state (**COMPLETED** or **FAILED**)<sup>3</sup>. In turn, the

<sup>3</sup>While **CANCELED** is also a terminal state, the **CANCELED** command cleanup is handled specially as part of the cancelling sequence and, as such, does not need to be handled here.

signal that a `FunctionCommandStatusType`, `FunctionCommandAckReportType`, and (if defined for the Function service) the `FunctionExecutionStatusReportType` can be disposed is when the corresponding `FunctionCommandType` has been disposed. This is shown in Figure 25.

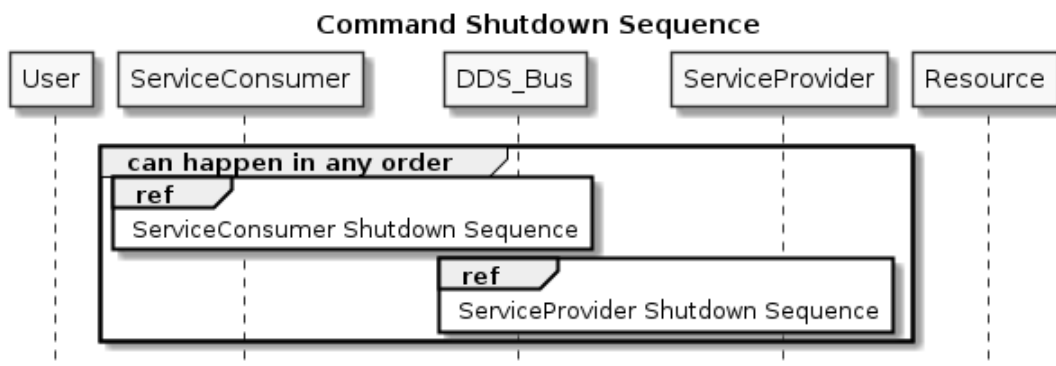


**Figure 25:** Sequence Diagram Showing Cleanup of the Bus When a Command Has Been Completed and the Service Consumer No Longer Wishes to Maintain the Commanded State.

### 5.1.6 Command Shutdown Sequence

As part of shutdown, both the Service Provider and Service Consumer are required to perform a shutdown sequence. This shutdown cleans up resources on the DDS bus and informs the system that the Service Provider and Service Consumer are no longer available.

The Service Provider and Service Consumer can shut down in any order. The sequence diagram is shown in Figure 26.

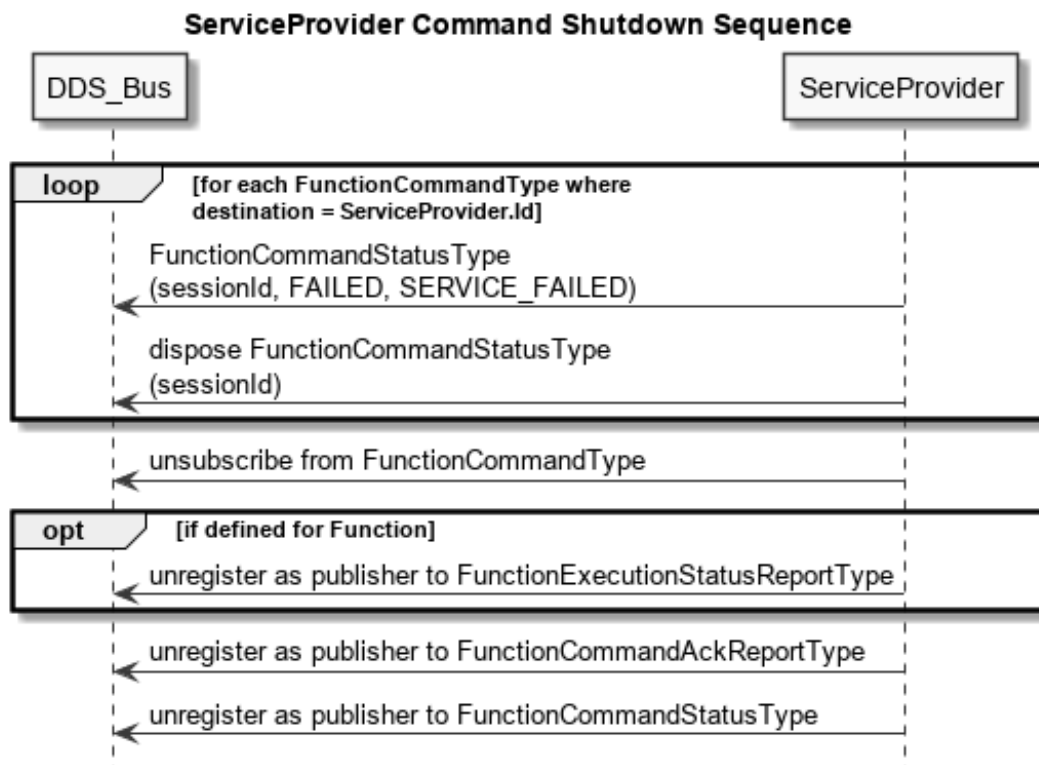


**Figure 26:** Sequence Diagram for Command Shutdown.

**5.1.6.1 Service Provider Shutdown Sequence** During shutdown, the Service Provider is required to fail any incomplete requests and then unregisters as a publisher of the `FunctionCommandStatusType`, `FunctionCommandAckReportType`, and (if defined for the Function service) the `FunctionExecutionStatusReportType`.

The Service Provider is also required to unsubscribe from the `FunctionCommandType`.

The Service Provider Shutdown sequence is shown in Figure 27.

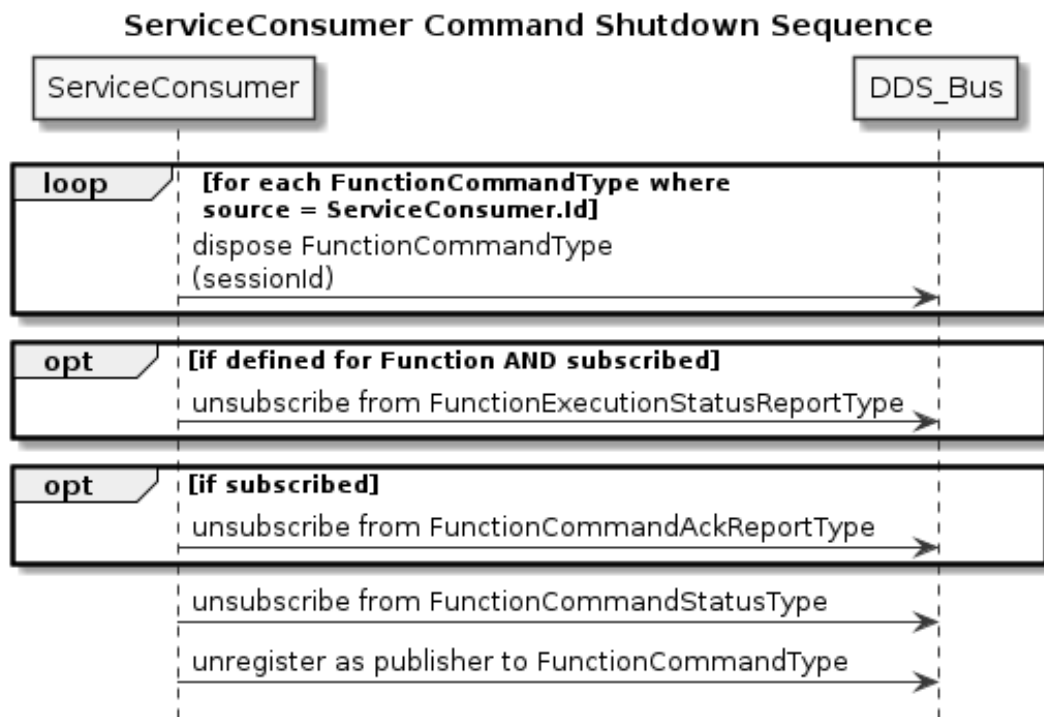


**Figure 27:** Sequence Diagram for Command Shutdown for Service Providers.

**5.1.6.2 Service Consumer Shutdown Sequence** During shutdown, the Service Consumer is required to cancel any incomplete requests and then unregister as a publisher of the `FunctionCommandType`.

The Service Consumer is also required to unsubscribe from the `FunctionCommandStatusType`, the `FunctionCommandAckReportType` if subscribed, and the `FunctionExecutionStatusReportType` if defined for the Function service and subscribed.

The Service Consumer Shutdown sequence is shown in Figure 28.



**Figure 28:** Sequence Diagram for Command Shutdown for Service Consumers.

## 5.2 Request / Reply

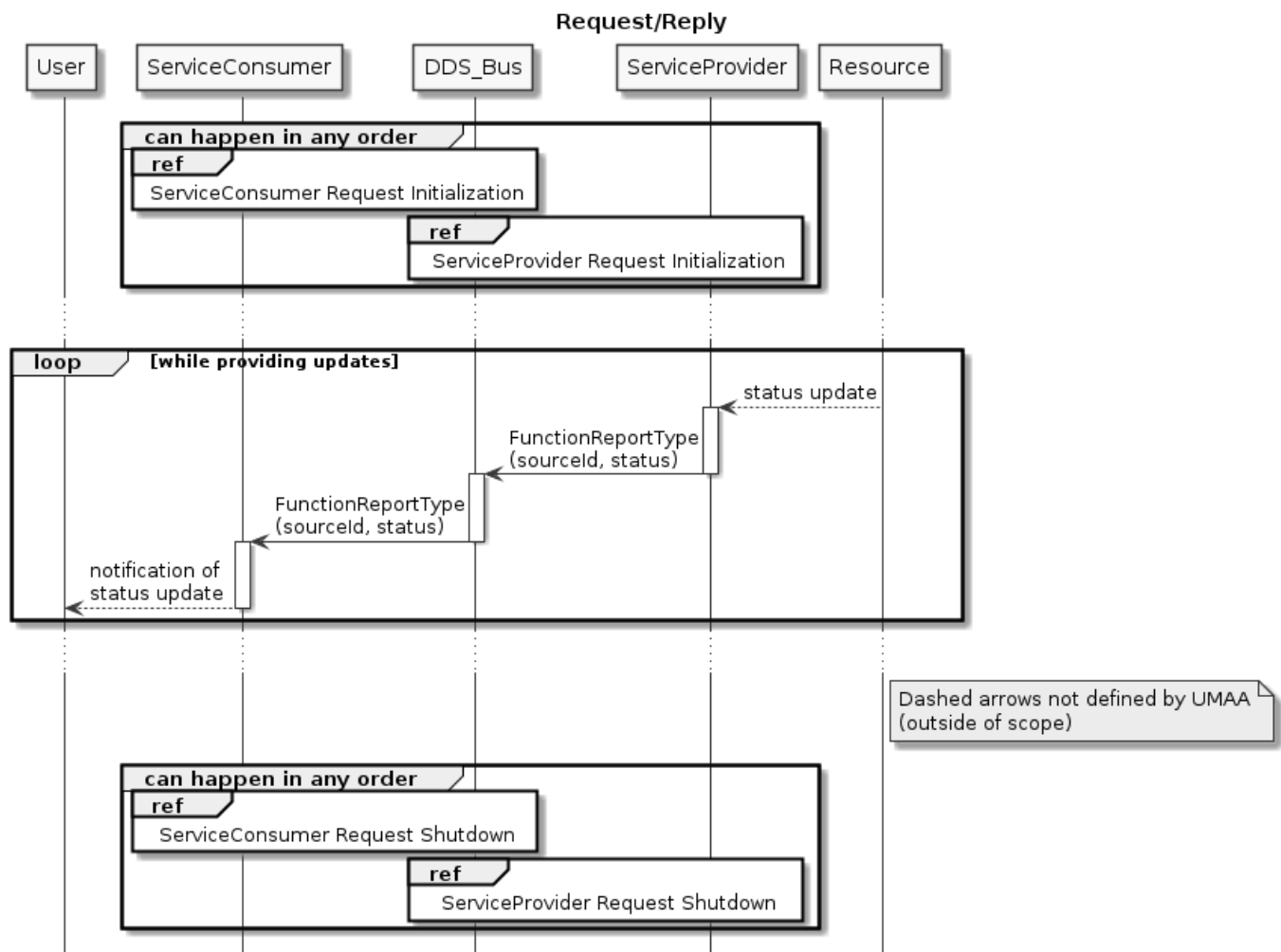
This section defines the flow of control for request/reply over the DDS bus. A request/reply is used to obtain data or status from a specific Service Provider.

A Service Provider is required to reply to all requests it receives. In the case of requests with no query data, this is accomplished via a DDS subscribe. In the case of a request with associated query data, a message with the query data must be published by the requester. To direct a request at a specific Service Provider or set of services, UMAA defines a **destination GUID** as part of requests.

The sequence diagrams in Sections 29 through 33 demonstrate different exchanges between a Service Consumer and Service Provider. Within the diagrams, the dashed arrows represent implementation-specific communications that are outside of UMAA's scope. Additionally, these sequence diagrams are examples of one possible implementation. Other implementations may have different communication patterns between the Service Provider and the Resource, or be implemented completely within the Service Provider process itself (no external Resource). However, in all implementations, UMAA-defined exchanges with the DDS bus between the Service Consumer and Service Provider must happen in the order shown within the sequence diagrams.

### 5.2.1 Request/Reply without Query Data

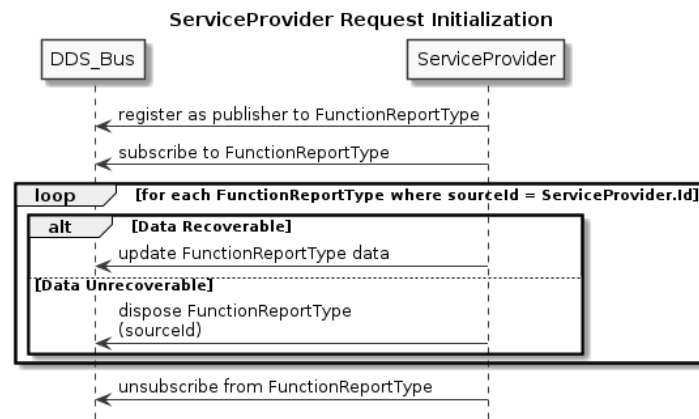
Figure 29 shows the sequence of exchanges in the case where there is no specific query data (i.e., the service is always just providing the current data to the bus).



**Figure 29:** Sequence Diagram for a Request/Reply for Report Data That Does Not Require any Specific Query Data.

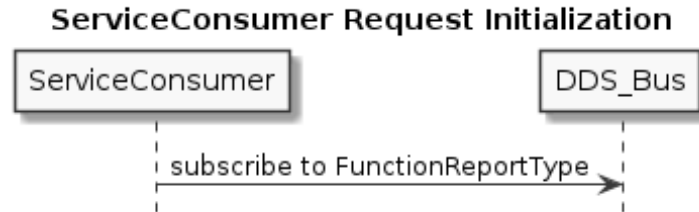
**5.2.1.1 Service Provider Startup Sequence** The Service Provider registers as a publisher of **FunctionReportTypes** to be able to respond to requests. The Service Provider must also handle reports that exist on the bus from a previous instantiation, either by providing an immediate update or, if the status is unrecoverable, disposing of the old **FunctionReportType**. This is shown in Figure 30.

As **FunctionReportType** updates are required (either through event-driven changes or periodic updates), the Service Provider publishes the updated data. The DDS bus will deliver the updates to the Service Consumer.



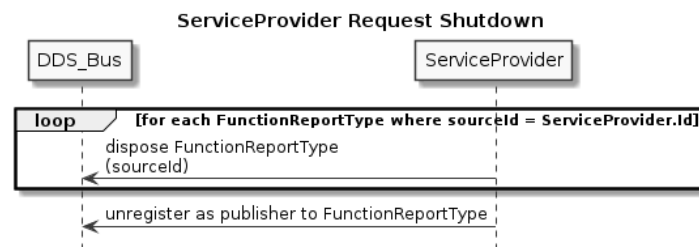
**Figure 30:** Sequence Diagram for Initialization of a Service Provider to Provide FunctionReportTypes.

**5.2.1.2 Service Consumer Startup Sequence** The Service Consumer subscribes to the FunctionReportType to signal an outstanding request for updates. This is shown in Figure 31.



**Figure 31:** Sequence Diagram for Initialization of a Service Consumer to Request FunctionReportTypes.

**5.2.1.3 Service Provider Shutdown** To no longer provide FunctionReportTypes, the Service Provider disposes of the FunctionReportType and unregisters as a publisher of the data (shown in Figure 32).



**Figure 32:** Sequence Diagram for Shutdown of a Service Provider.

**5.2.1.4 Service Consumer Shutdown** To no longer request FunctionReportTypes, the Service Consumer unsubscribes from FunctionReportType (shown in Figure 33).



**Figure 33:** Sequence Diagram for Shutdown of a Service Consumer.

### 5.2.2 Request/Reply with Query Data

Currently, UMAA does not define any request/reply interactions with query data, but it is expected that some will be defined. When defined, this section will be expanded to describe how they must be used.

## 6 Experimental Services (EXP) Services and Interfaces

### 6.1 Services and Interfaces

The interfaces in the following subsections describe how each UCS-UMAA topic is defined by listing the name, namespace, and member attributes. The "name" corresponds with the message name of a given service interface. The "namespace" defines the scope of the "name" where similar commands are grouped together. The "member attributes" are fields that can be populated with differing data types, e.g. a generic "depth" attribute could be populated with a double data value. Note that using a UCS-UMAA "Topic Name" requires using the fully-qualified namespace plus the topic name.

Each interface topic is referenced by a UMAA service and is defined as either an input or output interface.

Attributes ending in one or more asterisk(s) denote the following:

\* = Key (annotated with @key in IDL file; vendors may use different notation to indicate a key field)

† = Optional (annotated with @optional in IDL file; vendors may use different notation to indicate an optional field)

Optional fields should be handled as described in the UMAA Compliance Specification.

Commands issued on the DDS bus must be treated as if they are immutable in UMAA and, therefore, if updated (treated incorrectly as mutable), the resulting service actions are indeterminate and flow control protocols are no longer guaranteed.

#### Operations without DDS Topics

The following operations are all handled directly by DDS. They are marked in the operations tables with a  $\oplus$ .

query<...> - All query operations are used to retrieve the correlated report message. For UMAA, this operation is accomplished through subscribing to the appropriate DDS topic.

cancel<...> - All cancel operations are used to nullify the current command. For UMAA, this operation is accomplished through the DDS dispose action on the publisher.

report<...>CancelCommandStatus - All cancel reports are included here to show completeness of the MDE model mapping to UMAA. For UMAA, this operation is not used. Instead, the cancel status is inferred from the associated command status. If the cancel command is successful, the corresponding command will fail with a command status and reason of CANCELED. If the corresponding command status reports COMPLETED, then this cancel command has failed.

#### 6.1.1 AccelerationStatus

The purpose of this service is to report the current rate of change in linear velocity and rotational rate of the vehicle.

**Table 8:** AccelerationStatus Operations

| Service Requests (Inputs)  | Service Responses (Outputs) |
|----------------------------|-----------------------------|
| queryAcceleration $\oplus$ | reportAcceleration          |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

##### 6.1.1.1 reportAcceleration

**Description:** This operation is used to report the current rate of change in linear velocity and rotational rate of the vehicle.

**Namespace:** UMAA::SA::AccelerationStatus

**Topic:** AccelerationReport

**Data Type:** AccelerationReportType

**Table 9:** AccelerationReportType Message Definition

| Attribute Name                                                  | Attribute Type                                                    | Attribute Description                                                   |
|-----------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                                                   |                                                                         |
| acceleration                                                    | <a href="#">Acceleration3DPlatformXYZ</a>                         | The current rate of change in linear velocity of the vehicle.           |
| accelerationCovariance†                                         | <a href="#">CovarianceNEDAccelerationAccelerationType</a>         | The covariance matrix indicating the validity of the acceleration data. |
| attitudeAcceleration                                            | <a href="#">OrientationAcceleration3D</a>                         | The current rate of change in rotational rate of the vehicle.           |
| rotationalAccelerationCovariance†                               | <a href="#">CovarianceOrientationAccelerationAccelerationType</a> | The covariance matrix of the rotational acceleration data.              |

### 6.1.2 AdvanceRatioStatus

This service enables vehicle speed to be determined from motor or shaft RPM. It could be done statically as a lookup table or dynamically in order to take into consideration environmental conditions. An implementation would be unique per physical vehicle configuration.

**Table 10:** AdvanceRatioStatus Operations

| Service Requests (Inputs)           | Service Responses (Outputs)        |
|-------------------------------------|------------------------------------|
| <a href="#">queryAdvanceRatio</a> ⊕ | <a href="#">reportAdvanceRatio</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.2.1 reportAdvanceRatio

**Description:** This operation is used to report the current engine RPM to speed mappings.

**Namespace:** [UMAA::EO::AdvanceRatioStatus](#)

**Topic:** [AdvanceRatioReport](#)

**Data Type:** [AdvanceRatioReportType](#)

**Table 11:** AdvanceRatioReportType Message Definition

| Attribute Name                                                  | Attribute Type                                                        | Attribute Description                      |
|-----------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                                                       |                                            |
| advanceRatioValues                                              | <a href="#">sequence&lt;AdvanceRatioEntryType&gt;</a> max size = 1000 | The list of specific advance ratio values. |

### 6.1.3 AnalogVideoConfig

The purpose of this service is to provide access to the configuration of the analog camera, allowing the controlling component to set the camera to a particular operational profile.

**Table 12:** AnalogVideoConfig Operations

| Service Requests (Inputs)                | Service Responses (Outputs)             |
|------------------------------------------|-----------------------------------------|
| <a href="#">queryAnalogVideoConfig</a> ⊕ | <a href="#">reportAnalogVideoConfig</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.3.1 reportAnalogVideoConfig

**Description:** This operation is used to report the configuration of the analog video sensor.

**Namespace:** UMAA::SEM::AnalogVideoConfig

**Topic:** AnalogVideoConfigReport

**Data Type:** AnalogVideoConfigReportType

**Table 13:** AnalogVideoConfigReportType Message Definition

| Attribute Name                                                  | Attribute Type                        | Attribute Description                                   |
|-----------------------------------------------------------------|---------------------------------------|---------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                       |                                                         |
| analogVideoError                                                | <a href="#">AnalogSensorErrorType</a> | The error code associated with the analog video sensor. |
| videoFormat                                                     | <a href="#">VideoFormatEnumType</a>   | Current video format configuration.                     |

#### 6.1.4 AnalogVideoSpecs

The purpose of this service is to provide access to the capabilities of the analog camera. The actual transmission of the video stream is outside the scope of this service.

**Table 14:** AnalogVideoSpecs Operations

| Service Requests (Inputs)               | Service Responses (Outputs)            |
|-----------------------------------------|----------------------------------------|
| <a href="#">queryAnalogVideoSpecs</a> ⊕ | <a href="#">reportAnalogVideoSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

##### 6.1.4.1 reportAnalogVideoSpecs

**Description:** This operation is used to report the capabilities of a analog video sensor.

**Namespace:** UMAA::SEM::AnalogVideoSpecs

**Topic:** AnalogVideoSpecsReport

**Data Type:** AnalogVideoSpecsReportType

**Table 15:** AnalogVideoSpecsReportType Message Definition

| Attribute Name                                                    | Attribute Type                      | Attribute Description                                       |
|-------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                     |                                                             |
| videoFormat                                                       | <a href="#">VideoFormatEnumType</a> | Video format that is supporting by the analog video sensor. |

### 6.1.5 BallastTank

The purpose of this service is to provide the operations and interfaces to control and monitor the ballast tanks and their supporting pumps on the vehicle. The ballast tank control is measured by either volume or mass. The filled level of each tank can be commanded and monitored. Four modes of operation, Off, Fill, Empty, and Trim are supported per ballast pump. When trim mode is set, the BallastControl service is trying to keep the vehicle steady in a particular orientation at a desired depth.

**Table 16:** BallastTank Operations

| Service Requests (Inputs)                    | Service Responses (Outputs)                            |
|----------------------------------------------|--------------------------------------------------------|
| <a href="#">setBallastPump</a>               | <a href="#">reportBallastPumpCommandStatus</a>         |
| <a href="#">queryBallastPumpCommandAck</a> ⊕ | <a href="#">reportBallastPumpCommandAck</a>            |
| <a href="#">cancelBallastPumpCommand</a> ⊕   | <a href="#">reportBallastPumpCancelCommandStatus</a> ⊕ |
| <a href="#">queryBallastPump</a> ⊕           | <a href="#">reportBallastPump</a>                      |
| <a href="#">setBallastTank</a>               | <a href="#">reportBallastTankCommandStatus</a>         |
| <a href="#">queryBallastTankCommandAck</a> ⊕ | <a href="#">reportBallastTankCommandAck</a>            |
| <a href="#">cancelBallastTankCommand</a> ⊕   | <a href="#">reportBallastTankCancelCommandStatus</a> ⊕ |
| <a href="#">queryBallastTank</a> ⊕           | <a href="#">reportBallastTank</a>                      |
| <a href="#">queryBallastPumpSpecs</a> ⊕      | <a href="#">reportBallastPumpSpecs</a>                 |
| <a href="#">queryBallastTankSpecs</a> ⊕      | <a href="#">reportBallastTankSpecs</a>                 |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.5.1 reportBallastPump

**Description:** This operation is used to report the current status of the ballast pumps on the vehicle.

**Namespace:** [UMAA::EO::BallastTank](#)

**Topic:** [BallastPumpReport](#)

**Data Type:** [BallastPumpReportType](#)

**Table 17:** BallastPumpReportType Message Definition

| Attribute Name                                                    | Attribute Type | Attribute Description |
|-------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                |                       |

| Attribute Name  | Attribute Type                     | Attribute Description                      |
|-----------------|------------------------------------|--------------------------------------------|
| massFillRate†   | <a href="#">MassFlowRate</a>       | The flow rate to fill or empty the mass.   |
| state           | <a href="#">PumpStateEnumType</a>  | The current state of the ballast.          |
| volumeFlowRate† | <a href="#">VolumetricFlowRate</a> | The flow rate to fill or empty the volume. |

### 6.1.5.2 reportBallastPumpCommandAck

**Description:** This operation is used to provide the BallastPump commanded values.

**Namespace:** UMAA::EO::BallastTank

**Topic:** BallastPumpCommandAckReport

**Data Type:** BallastPumpCommandAckReportType

**Table 18:** BallastPumpCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                         | Attribute Description |
|-----------------------------------------------------------------------------|----------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                        |                       |
| command                                                                     | <a href="#">BallastPumpCommandType</a> | The source command.   |

### 6.1.5.3 reportBallastPumpCommandStatus

**Description:** This operation is used to report the status of the current BallastPump command.

**Namespace:** UMAA::EO::BallastTank

**Topic:** BallastPumpCommandStatus

**Data Type:** BallastPumpCommandStatusType

**Table 19:** BallastPumpCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.5.4 reportBallastPumpSpecs

**Description:** This operation is used to report the specifications of the ballast pumps on the vehicle.

**Namespace:** UMAA::EO::BallastTank

**Topic:** BallastPumpSpecsReport

**Data Type:** BallastPumpSpecsReportType

**Table 20:** BallastPumpSpecsReportType Message Definition

| Attribute Name                                                  | Attribute Type                     | Attribute Description                      |
|-----------------------------------------------------------------|------------------------------------|--------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                    |                                            |
| maxMassEmptyRate                                                | <a href="#">MassFlowRate</a>       | The maximum flow rate to empty the mass.   |
| maxMassFillRate                                                 | <a href="#">MassFlowRate</a>       | The maximum flow rate to fill the mass.    |
| maxVolumeEmptyRate                                              | <a href="#">VolumetricFlowRate</a> | The maximum flow rate to empty the volume. |
| maxVolumeFillRate                                               | <a href="#">VolumetricFlowRate</a> | The maximum flow rate to fill the volume.  |
| minMassEmptyRate                                                | <a href="#">MassFlowRate</a>       | The minimum flow rate to empty the mass.   |
| minMassFillRate                                                 | <a href="#">MassFlowRate</a>       | The minimum flow rate to fill the mass.    |
| minVolumeEmptyRate                                              | <a href="#">VolumetricFlowRate</a> | The minimum flow rate to empty the volume. |
| minVolumeFillRate                                               | <a href="#">VolumetricFlowRate</a> | The minimum flow rate to fill the volume.  |

#### 6.1.5.5 reportBallastTank

**Description:** This operation is used to report the current status of the ballast tanks on the vehicle.

**Namespace:** UMAA::EO::BallastTank

**Topic:** BallastTankReport

**Data Type:** BallastTankReportType

**Table 21:** BallastTankReportType Message Definition

| Attribute Name                                                  | Attribute Type                      | Attribute Description                               |
|-----------------------------------------------------------------|-------------------------------------|-----------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                     |                                                     |
| level†                                                          | <a href="#">VolumePercent</a>       | The current volume level.                           |
| lowPressureLimit                                                | <a href="#">PressureKiloPascals</a> | The minimum allowable pressure of the ballast tank. |
| mass†                                                           | <a href="#">Mass</a>                | The current mass level.                             |
| pressure                                                        | <a href="#">PressureKiloPascals</a> | The current pressure of the ballast tank.           |
| pressureLimit                                                   | <a href="#">PressureKiloPascals</a> | The maximum allowable pressure of the ballast tank. |
| trimActive                                                      | <a href="#">boolean</a>             | The status of ballast tank trim.                    |

#### 6.1.5.6 reportBallastTankCommandAck

**Description:** This operation is used to provide the BallastTank commanded values.

**Namespace:** UMAA::EO::BallastTank

**Topic:** BallastTankCommandAckReport

**Data Type:** BallastTankCommandAckReportType

**Table 22:** BallastTankCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                         | Attribute Description |
|-----------------------------------------------------------------------------|----------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                        |                       |
| command                                                                     | <a href="#">BallastTankCommandType</a> | The source command.   |

#### 6.1.5.7 reportBallastTankCommandStatus

**Description:** This operation is used to report the status of the current BallastTank command.

**Namespace:** UMAA::EO::BallastTank

**Topic:** BallastTankCommandStatus

**Data Type:** BallastTankCommandStatusType

**Table 23:** BallastTankCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.5.8 reportBallastTankSpecs

**Description:** This operation is used to report the specifications of the ballast tanks on the vehicle.

**Namespace:** UMAA::EO::BallastTank

**Topic:** BallastTankSpecsReport

**Data Type:** BallastTankSpecsReportType

**Table 24:** BallastTankSpecsReportType Message Definition

| Attribute Name                                                   | Attribute Type                         | Attribute Description                    |
|------------------------------------------------------------------|----------------------------------------|------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAAStatus</a> |                                        |                                          |
| massCapacity                                                     | <a href="#">Mass</a>                   | The mass capacity of the ballast tank.   |
| name                                                             | <a href="#">StringShortDescription</a> | The name of the ballast tank.            |
| trimTank                                                         | <a href="#">boolean</a>                | True if this is a trim tank.             |
| volumeCapacity                                                   | <a href="#">VolumeCubicMeter</a>       | The volume capacity of the ballast tank. |

### 6.1.5.9 setBallastPump

**Description:** This operation is used to set the BallastPump command.

**Namespace:** UMAA::EO::BallastTank

**Topic:** BallastPumpCommand

**Data Type:** BallastPumpCommandType

**Table 25:** BallastPumpCommandType Message Definition

| Attribute Name                                                    | Attribute Type                          | Attribute Description                                    |
|-------------------------------------------------------------------|-----------------------------------------|----------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                         |                                                          |
| ballastPumpFlowRate                                               | <a href="#">BallastPumpFlowRateType</a> | The desired flow rate to fill or empty the ballast pump. |

### 6.1.5.10 setBallastTank

**Description:** This operation is used to set the BallastTank command.

**Namespace:** UMAA::EO::BallastTank

**Topic:** BallastTankCommand

**Data Type:** BallastTankCommandType

**Table 26:** BallastTankCommandType Message Definition

| Attribute Name                                                    | Attribute Type                  | Attribute Description                        |
|-------------------------------------------------------------------|---------------------------------|----------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                 |                                              |
| ballastFill                                                       | <a href="#">BallastFillType</a> | The optional elevation used for the vehicle. |

### 6.1.6 BeaconParametersControl

The purpose of this service is to provide a mechanism to control the beacon sensor on-board of the vehicle.

**Table 27:** BeaconParametersControl Operations

| Service Requests (Inputs)                         | Service Responses (Outputs)                                 |
|---------------------------------------------------|-------------------------------------------------------------|
| <a href="#">setBeaconParameters</a>               | <a href="#">reportBeaconParametersCommandStatus</a>         |
| <a href="#">queryBeaconParametersCommandAck</a> ⊕ | <a href="#">reportBeaconParametersCommandAck</a>            |
| <a href="#">cancelBeaconParametersCommand</a> ⊕   | <a href="#">reportBeaconParametersCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.6.1 reportBeaconParametersCommandAck

**Description:** This operation is used to report the current beacon system command on-board of the vehicle.

**Namespace:** UMAA::SEM::BeaconParametersControl

**Topic:** BeaconParametersCommandAckReport

**Data Type:** BeaconParametersCommandAckReportType

**Table 28:** BeaconParametersCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                              | Attribute Description |
|-----------------------------------------------------------------------------|---------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                             |                       |
| command                                                                     | <a href="#">BeaconParametersCommandType</a> | The source command.   |

#### 6.1.6.2 reportBeaconParametersCommandStatus

**Description:** This operation is used to report the current status of the beacon system command on-board of the vehicle.

**Namespace:** UMAA::SEM::BeaconParametersControl

**Topic:** BeaconParametersCommandStatus

**Data Type:** BeaconParametersCommandStatusType

**Table 29:** BeaconParametersCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.6.3 setBeaconParameters

**Description:** This operation is used to control beacon system on-board of the vehicle.

**Namespace:** UMAA::SEM::BeaconParametersControl

**Topic:** BeaconParametersCommand

**Data Type:** BeaconParametersCommandType

**Table 30:** BeaconParametersCommandType Message Definition

| Attribute Name                                                    | Attribute Type | Attribute Description                      |
|-------------------------------------------------------------------|----------------|--------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                |                                            |
| frequencyBand                                                     | Count          | A desired frequency band.                  |
| IRLightsArmed                                                     | boolean        | A desired armed/disarmed infrared light.   |
| IRLightsOn                                                        | boolean        | A desired on/off infrared light.           |
| locatorArmed                                                      | boolean        | A desired armed/disarmed of the locator.   |
| locatorOn                                                         | boolean        | A desired on/off locator.                  |
| multibandLocator                                                  | boolean        | A desired on/off of the multiband locator. |
| RGLightsArmed                                                     | boolean        | A desired armed/disarmed green light.      |
| RGLightsOn                                                        | boolean        | A desired on/off green light.              |
| transmitChannel                                                   | Count          | A desired transmit channel.                |

### 6.1.7 BeaconParametersStatus

The purpose of this service is to provide a mechanism to report status from the beacon sensor on-board of the vehicle.

**Table 31:** BeaconParametersStatus Operations

| Service Requests (Inputs)               | Service Responses (Outputs)            |
|-----------------------------------------|----------------------------------------|
| <a href="#">queryBeaconParameters</a> ⊕ | <a href="#">reportBeaconParameters</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.7.1 reportBeaconParameters

**Description:** This operation is used to report the current status of beacon system on-board of the vehicle.

**Namespace:** [UMAA::SEM::BeaconParametersStatus](#)

**Topic:** [BeaconParametersReport](#)

**Data Type:** [BeaconParametersReportType](#)

**Table 32:** BeaconParametersReportType Message Definition

| Attribute Name                                                  | Attribute Type | Attribute Description                                  |
|-----------------------------------------------------------------|----------------|--------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                |                                                        |
| frequencyBand                                                   | Count          | A current frequency band.                              |
| IRLightsArmed                                                   | boolean        | A current armed/disarmed status of the infrared light. |
| IRLightsOn                                                      | boolean        | A current on/off status of the infrared light.         |
| locatorArmed                                                    | boolean        | A current armed/disarmed status of the locator.        |
| locatorOn                                                       | boolean        | A current on/off status locator.                       |

| Attribute Name   | Attribute Type          | Attribute Description                                 |
|------------------|-------------------------|-------------------------------------------------------|
| multibandLocator | <a href="#">boolean</a> | A current on/off status of the multiband locator.     |
| RGLightsArmed    | <a href="#">boolean</a> | The current armed/disarmed status of the green light. |
| RGLightsOn       | <a href="#">boolean</a> | A current on/off status the green light.              |
| transmitChannel  | <a href="#">Count</a>   | A current transmit channel.                           |

### 6.1.8 BellControl

The purpose of this service is to provide the operations and interfaces to control and monitor the vehicle's bell.

**Table 33:** BellControl Operations

| Service Requests (Inputs)             | Service Responses (Outputs)                     |
|---------------------------------------|-------------------------------------------------|
| <a href="#">setBell</a>               | <a href="#">reportBellCommandStatus</a>         |
| <a href="#">queryBellCommandAck</a> ⊕ | <a href="#">reportBellCommandAck</a>            |
| <a href="#">cancelBellCommand</a> ⊕   | <a href="#">reportBellCancelCommandStatus</a> ⊕ |
| <a href="#">queryBell</a> ⊕           | <a href="#">reportBell</a>                      |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.8.1 reportBell

**Description:** This operation is used to report the current state of the bell sounding device on the vehicle.

**Namespace:** UMAA::EO::BellControl

**Topic:** BellReport

**Data Type:** BellReportType

**Table 34:** BellReportType Message Definition

| Attribute Name                                                  | Attribute Type                         | Attribute Description                                                                      |
|-----------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                        |                                                                                            |
| blastCondition†                                                 | <a href="#">BlastConditionEnumType</a> | The blast state of the annunciator.                                                        |
| blastNumber†                                                    | <a href="#">PositiveCount</a>          | The number of times blasted within the current set; includes current blast if in progress. |
| status                                                          | <a href="#">OnOffStatusEnumType</a>    | The current on/off status of the bell switch.                                              |

#### 6.1.8.2 reportBellCommandAck

**Description:** This operation is used to provide the Bell commanded values.

**Namespace:** UMAA::EO::BellControl

**Topic:** BellCommandAckReport

**Data Type:** BellCommandAckReportType

**Table 35:** BellCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                  | Attribute Description |
|-----------------------------------------------------------------------------|---------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                 |                       |
| command                                                                     | <a href="#">BellCommandType</a> | The source command.   |

### 6.1.8.3 reportBellCommandStatus

**Description:** This operation is used to report the state of the bell sounding device command on the vehicle.

**Namespace:** UMAA::EO::BellControl

**Topic:** BellCommandStatus

**Data Type:** BellCommandStatusType

**Table 36:** BellCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.8.4 setBell

**Description:** This operation is used to control the bell sounding device on the vehicle. If the command attributes do not specify a determinate end of execution, the consumer must perform a "cancel" of the command to initiate the end of command execution.

**Namespace:** UMAA::EO::BellControl

**Topic:** BellCommand

**Data Type:** BellCommandType

**Table 37:** BellCommandType Message Definition

| Attribute Name                                                    | Attribute Type                      | Attribute Description                                                           |
|-------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                     |                                                                                 |
| blasting†                                                         | <a href="#">BlastPropertiesType</a> | Blast properties. If the attribute is not provided, it means turn off the bell. |

### 6.1.9 BilgePumpConfig

The purpose of this service is to provide the operations and interfaces to report the configuration of the bilge pumps on the vehicle.

**Table 38:** BilgePumpConfig Operations

| Service Requests (Inputs)              | Service Responses (Outputs)           |
|----------------------------------------|---------------------------------------|
| <a href="#">queryBilgePumpConfig</a> ⊕ | <a href="#">reportBilgePumpConfig</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.9.1 reportBilgePumpConfig

**Description:** This operation is used to report the configuration of the bilge pumps on the vehicle.

**Namespace:** UMAA::EO::BilgePumpConfig

**Topic:** BilgePumpConfigReport

**Data Type:** BilgePumpConfigReportType

**Table 39:** BilgePumpConfigReportType Message Definition

| Attribute Name                                                  | Attribute Type                         | Attribute Description       |
|-----------------------------------------------------------------|----------------------------------------|-----------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                        |                             |
| name                                                            | <a href="#">StringShortDescription</a> | The name of the bilge pump. |

### 6.1.10 BilgePumpControl

The purpose of this service is to provide the operations and interfaces to control and monitor the bilge pumps on the vehicle. Three modes of operation, Off, On, and Auto are supported per bilge pump. The auto mode means the pump will automatically be turned on by the service when flood is detected in its responsible area. Note: Flood and leak reporting is provided by the Compartment Sensor Service.

**Table 40:** BilgePumpControl Operations

| Service Requests (Inputs)                  | Service Responses (Outputs)                          |
|--------------------------------------------|------------------------------------------------------|
| <a href="#">setBilgePump</a>               | <a href="#">reportBilgePumpCommandStatus</a>         |
| <a href="#">queryBilgePumpCommandAck</a> ⊕ | <a href="#">reportBilgePumpCommandAck</a>            |
| <a href="#">cancelBilgePumpCommand</a> ⊕   | <a href="#">reportBilgePumpCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

### 6.1.10.1 reportBilgePumpCommandAck

**Description:** This operation is used to provide the BilgePump commanded values.

**Namespace:** UMAA::EO::BilgePumpControl

**Topic:** BilgePumpCommandAckReport

**Data Type:** BilgePumpCommandAckReportType

**Table 41:** BilgePumpCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                       | Attribute Description |
|-----------------------------------------------------------------------------|--------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                      |                       |
| command                                                                     | <a href="#">BilgePumpCommandType</a> | The source command.   |

### 6.1.10.2 reportBilgePumpCommandStatus

**Description:** This operation is used to report the status of the bilge pump command.

**Namespace:** UMAA::EO::BilgePumpControl

**Topic:** BilgePumpCommandStatus

**Data Type:** BilgePumpCommandStatusType

**Table 42:** BilgePumpCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.10.3 setBilgePump

**Description:** This operation is used to activate the state of the bilge pumps on the vehicle. When in auto state, the pump will be automatically turned on when flood is detected. If the command attributes do not specify a determinate end of execution, the consumer must perform a "cancel" of the command to initiate the end of command execution.

**Namespace:** UMAA::EO::BilgePumpControl

**Topic:** BilgePumpCommand

**Data Type:** BilgePumpCommandType

**Table 43:** BilgePumpCommandType Message Definition

| Attribute Name                                                    | Attribute Type                       | Attribute Description                                                                                                     |
|-------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                      |                                                                                                                           |
| state                                                             | <a href="#">BilgeControlEnumType</a> | The desired state of the bilge pump. When in auto state, the pump will be automatically turned on when flood is detected. |

### 6.1.11 BilgePumpStatus

The purpose of this service is to provide the operations and interfaces to monitor the bilge pumps on the vehicle. Three modes of operation, Off, On, and Auto are supported per bilge pump. The auto mode means the pump will automatically be turned on by the service when flood is detected in its responsible area. Note: Flood and leak reporting is provided by the Compartment Sensor Service.

**Table 44:** BilgePumpStatus Operations

| Service Requests (Inputs)        | Service Responses (Outputs)     |
|----------------------------------|---------------------------------|
| <a href="#">queryBilgePump</a> ⊕ | <a href="#">reportBilgePump</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.11.1 reportBilgePump

**Description:** This operation is used to report the current state of the bilge pumps on the vehicle.

**Namespace:** UMAA::EO::BilgePumpStatus

**Topic:** BilgePumpReport

**Data Type:** BilgePumpReportType

**Table 45:** BilgePumpReportType Message Definition

| Attribute Name                                                  | Attribute Type                     | Attribute Description        |
|-----------------------------------------------------------------|------------------------------------|------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                    |                              |
| state                                                           | <a href="#">BilgeStateEnumType</a> | The state of the bilge pump. |

### 6.1.12 BucketConfig

The purpose of this service is to provide the operations and interfaces to report bucket configuration. A water jet driven boat typically has a bucket for controlling the forward/reverse thrust.

**Table 46:** BucketConfig Operations

| Service Requests (Inputs)           | Service Responses (Outputs)        |
|-------------------------------------|------------------------------------|
| <a href="#">queryBucketConfig</a> ⊕ | <a href="#">reportBucketConfig</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.12.1 reportBucketConfig

**Description:** This operation is used to report the configuration of the buckets on the vehicle.

**Namespace:** UMAA::EO::BucketConfig

**Topic:** BucketConfigReport

**Data Type:** BucketConfigReportType

**Table 47:** BucketConfigReportType Message Definition

| Attribute Name                                                  | Attribute Type                         | Attribute Description   |
|-----------------------------------------------------------------|----------------------------------------|-------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                        |                         |
| name                                                            | <a href="#">StringShortDescription</a> | The name of the bucket. |

#### 6.1.13 BucketControl

The purpose of this service is to provide the operations and interfaces to set bucket positions. A water jet driven boat typically has a bucket for controlling the forward/reverse thrust.

**Table 48:** BucketControl Operations

| Service Requests (Inputs)               | Service Responses (Outputs)                       |
|-----------------------------------------|---------------------------------------------------|
| <a href="#">setBucket</a>               | <a href="#">reportBucketCommandStatus</a>         |
| <a href="#">queryBucketCommandAck</a> ⊕ | <a href="#">reportBucketCommandAck</a>            |
| <a href="#">cancelBucketCommand</a> ⊕   | <a href="#">reportBucketCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.13.1 reportBucketCommandAck

**Description:** This operation is used to report the commanded bucket position of the vehicle.

**Namespace:** UMAA::EO::BucketControl

**Topic:** BucketCommandAckReport

**Data Type:** BucketCommandAckReportType

**Table 49:** BucketCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                    | Attribute Description |
|-----------------------------------------------------------------------------|-----------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                   |                       |
| command                                                                     | <a href="#">BucketCommandType</a> | The source command.   |

### 6.1.13.2 reportBucketCommandStatus

**Description:** This operation is used to report the status of the bucket position command.

**Namespace:** UMAA::EO::BucketControl

**Topic:** BucketCommandStatus

**Data Type:** BucketCommandStatusType

**Table 50:** BucketCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.13.3 setBucket

**Description:** This operation is used to control the bucket position for forward or reverse thrust of the vehicle.

**Namespace:** UMAA::EO::BucketControl

**Topic:** BucketCommand

**Data Type:** BucketCommandType

**Table 51:** BucketCommandType Message Definition

| Attribute Name                                                    | Attribute Type                | Attribute Description                                                    |
|-------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                               |                                                                          |
| bucketPosition                                                    | <a href="#">AnglePosition</a> | The desired position of the bucket to control forward or reserve thrust. |

### 6.1.14 BucketStatus

The purpose of this service is to provide the operations and interfaces to report bucket positions. A water jet driven boat typically has a bucket for controlling the forward/reverse thrust.

**Table 52:** BucketStatus Operations

| Service Requests (Inputs)     | Service Responses (Outputs)  |
|-------------------------------|------------------------------|
| <a href="#">queryBucket</a> ⊕ | <a href="#">reportBucket</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.14.1 reportBucket

**Description:** This operation is used to report the current position of the bucket on the vehicle.

**Namespace:** UMAA::EO::BucketStatus

**Topic:** BucketReport

**Data Type:** BucketReportType

**Table 53:** BucketReportType Message Definition

| Attribute Name                                                  | Attribute Type                | Attribute Description        |
|-----------------------------------------------------------------|-------------------------------|------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                               |                              |
| bucketPosition                                                  | <a href="#">AnglePosition</a> | The current bucket position. |

### 6.1.15 CameraConfig

The purpose of this service is to provide basic configuration of the camera on board of the vehicle.

**Table 54:** CameraConfig Operations

| Service Requests (Inputs)              | Service Responses (Outputs)                             |
|----------------------------------------|---------------------------------------------------------|
| <a href="#">setCameraConfig</a>        | <a href="#">reportCameraConfigCommandStatus</a>         |
| <a href="#">cancelCameraConfig</a> ⊕   | <a href="#">reportCameraCancelConfigCommandStatus</a> ⊕ |
| <a href="#">queryCameraConfig</a> ⊕    | <a href="#">reportCameraConfig</a>                      |
| <a href="#">queryCameraConfigAck</a> ⊕ | <a href="#">reportCameraConfigAck</a>                   |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.15.1 reportCameraConfig

**Description:** This operation is used to report the current configuration of the camera.

**Namespace:** UMAA::SEM::CameraControl

**Topic:** CameraConfigReport

**Data Type:** CameraConfigReportType

**Table 55:** CameraConfigReportType Message Definition

| Attribute Name                                                    | Attribute Type                                   | Attribute Description                                                                                                                      |
|-------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                                  |                                                                                                                                            |
| aperture                                                          | <a href="#">DistancePrecise</a>                  | The current aperture of the camera.                                                                                                        |
| exposureMode                                                      | <a href="#">ExposureModeEnumType</a>             | The current exposure mode.                                                                                                                 |
| focalLength                                                       | <a href="#">DistancePrecise</a>                  | The current focal length of the sensor.                                                                                                    |
| focusMode                                                         | <a href="#">AutomationEnumType</a>               | The current focus mode of the camera.                                                                                                      |
| focusValue                                                        | <a href="#">FocusValue</a>                       | The current focus value that allows incremental changes in focus position based on the percentage of the entire focal range of the camera. |
| horizontalFOV                                                     | <a href="#">FieldOfViewLineOfSightFocalPlane</a> | The current horizontal Field of View (FOV) of the camera.                                                                                  |
| imageStabilization                                                | <a href="#">boolean</a>                          | The current image stabilization.                                                                                                           |
| imagingMode                                                       | <a href="#">ImagingModeEnumType</a>              | The current imaging mode.                                                                                                                  |
| lightSensitivity                                                  | <a href="#">LightSensitivityEnumType</a>         | The current light sensitivity of the camera.                                                                                               |
| maxZoomLevel                                                      | <a href="#">CameraZoomLevel</a>                  | The current maximum zoom level.                                                                                                            |
| meteringMode                                                      | <a href="#">MeteringModeEnumType</a>             | The current metering mode.                                                                                                                 |
| minZoomLevel                                                      | <a href="#">CameraZoomLevel</a>                  | The current minimum zoom level.                                                                                                            |
| shutterSpeed                                                      | <a href="#">DurationSeconds</a>                  | The current shutter speed of the camera.                                                                                                   |
| status                                                            | <a href="#">PowerStatusEnumType</a>              | The current power status.                                                                                                                  |
| verticalFOV                                                       | <a href="#">FieldOfViewLineOfSightFocalPlane</a> | The current vertical Field of View (FOV) of the camera.                                                                                    |
| whiteBalance                                                      | <a href="#">WhiteBalanceEnumType</a>             | The current white balance.                                                                                                                 |
| zoomLevel                                                         | <a href="#">CameraZoomLevel</a>                  | The current zoom level.                                                                                                                    |
| zoomMode                                                          | <a href="#">ZoomModeEnumType</a>                 | The current zoom mode.                                                                                                                     |

#### 6.1.15.2 reportCameraConfigAck

**Description:** This operation is used to report the current Camera configuration.

**Namespace:** UMAA::SEM::CameraControl

**Topic:** CameraConfigAckReport

**Data Type:** CameraConfigAckReportType

**Table 56:** CameraConfigAckReportType Message Definition

| Attribute Name                                                  | Attribute Type                          | Attribute Description     |
|-----------------------------------------------------------------|-----------------------------------------|---------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                         |                           |
| config                                                          | <a href="#">CameraConfigCommandType</a> | The source configuration. |

**6.1.15.3 reportCameraConfigCommandStatus**

**Description:** This operation is used to report the status of the configuration command of the camera.

**Namespace:** UMAA::SEM::CameraControl

**Topic:** CameraConfigCommandStatus

**Data Type:** CameraConfigCommandStatusType

**Table 57:** CameraConfigCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.15.4 setCameraConfig**

**Description:** This operation is used to set the configuration of the camera.

**Namespace:** UMAA::SEM::CameraControl

**Topic:** CameraConfigCommand

**Data Type:** CameraConfigCommandType

**Table 58:** CameraConfigCommandType Message Definition

| Attribute Name                                                    | Attribute Type                            | Attribute Description                                                                                                                      |
|-------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                           |                                                                                                                                            |
| aperture                                                          | <a href="#">DistancePrecise</a>           | The current aperture of the camera.                                                                                                        |
| builtInTest†                                                      | <a href="#">BuiltInTestStatusEnumType</a> | Used to run a built-in test to the payload.                                                                                                |
| exposureMode                                                      | <a href="#">ExposureModeEnumType</a>      | The current exposure mode.                                                                                                                 |
| focalLength                                                       | <a href="#">DistancePrecise</a>           | The current focal length of the sensor.                                                                                                    |
| focusMode                                                         | <a href="#">AutomationEnumType</a>        | The current focus mode of the camera.                                                                                                      |
| focusValue                                                        | <a href="#">FocusValue</a>                | The current focus value that allows incremental changes in focus position based on the percentage of the entire focal range of the camera. |

| Attribute Name     | Attribute Type                           | Attribute Description                        |
|--------------------|------------------------------------------|----------------------------------------------|
| imageStabilization | <a href="#">boolean</a>                  | The current image stabilization.             |
| imagingMode        | <a href="#">ImagingModeEnumType</a>      | The current imaging mode.                    |
| lightSensitivity   | <a href="#">LightSensitivityEnumType</a> | The current light sensitivity of the camera. |
| meteringMode       | <a href="#">MeteringModeEnumType</a>     | The current metering mode.                   |
| shutterSpeed       | <a href="#">DurationSeconds</a>          | The current shutter speed of the camera.     |
| status             | <a href="#">PowerStatusEnumType</a>      | The current power status.                    |
| whiteBalance       | <a href="#">WhiteBalanceEnumType</a>     | The current white balance.                   |
| zoomLevel          | <a href="#">CameraZoomLevel</a>          | The current zoom level.                      |
| zoomMode           | <a href="#">ZoomModeEnumType</a>         | The current zoom mode.                       |

### 6.1.16 CameraControl

The purpose of this service is to provide control of the camera on board of the vehicle.

**Table 59:** CameraControl Operations

| Service Requests (Inputs)               | Service Responses (Outputs)                       |
|-----------------------------------------|---------------------------------------------------|
| <a href="#">setCamera</a>               | <a href="#">reportCameraCommandStatus</a>         |
| <a href="#">queryCameraCommandAck</a> ⊕ | <a href="#">reportCameraCommandAck</a>            |
| <a href="#">cancelCameraCommand</a> ⊕   | <a href="#">reportCameraCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.16.1 reportCameraCommandAck

**Description:** This operation is used to provide the Camera commanded values.

**Namespace:** UMAA::SEM::CameraControl

**Topic:** CameraCommandAckReport

**Data Type:** CameraCommandAckReportType

**Table 60:** CameraCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                    | Attribute Description |
|-----------------------------------------------------------------------------|-----------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                   |                       |
| command                                                                     | <a href="#">CameraCommandType</a> | The source command.   |

#### 6.1.16.2 reportCameraCommandStatus

**Description:** This operation is used to report the current status of the set camera command.

**Namespace:** UMAA::SEM::CameraControl

**Topic:** CameraCommandStatus

**Data Type:** CameraCommandStatusType

**Table 61:** CameraCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.16.3 setCamera

**Description:** This operation is used to set image center, mode and filtered of a camera.

**Namespace:** UMAA::SEM::CameraControl

**Topic:** CameraCommand

**Data Type:** CameraCommandType

**Table 62:** CameraCommandType Message Definition

| Attribute Name                                                    | Attribute Type                            | Attribute Description                       |
|-------------------------------------------------------------------|-------------------------------------------|---------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                           |                                             |
| builtInTest†                                                      | <a href="#">BuiltInTestStatusEnumType</a> | Used to run a built-in test to the payload. |
| filtered                                                          | <a href="#">boolean</a>                   | The desired image filtered.                 |
| imageCenterLocation                                               | <a href="#">GeoPosition2D</a>             | The desired center location of the image.   |
| mode                                                              | <a href="#">IRPolarityEnumType</a>        | The desired image polarity of the camera.   |

### 6.1.17 CameraSelectionControl

The purpose of this service is to provide a mechanism to select a camera on a particular multiplexer.

**Table 63:** CameraSelectionControl Operations

| Service Requests (Inputs)                     | Service Responses (Outputs)                               |
|-----------------------------------------------|-----------------------------------------------------------|
| <a href="#">setCameraSelection</a>            | <a href="#">reportCameraSelectionCommandStatus</a>        |
| <a href="#">queryCameraSelectionCommand⊕</a>  | <a href="#">reportCameraSelectionCommand</a>              |
| <a href="#">cancelCameraSelectionCommand⊕</a> | <a href="#">reportCameraSelectionCancelCommandStatus⊕</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.17.1 reportCameraSelectionCommand

**Description:** This operation is used to report the current camera command.

**Namespace:** UMAA::SEM::CameraSelectionControl

**Topic:** CameraSelectionCommandAckReport

**Data Type:** CameraSelectionCommandAckReportType

**Table 64:** CameraSelectionCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                             | Attribute Description |
|-----------------------------------------------------------------------------|--------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                            |                       |
| command                                                                     | <a href="#">CameraSelectionCommandType</a> | The source command.   |

#### 6.1.17.2 reportCameraSelectionCommandStatus

**Description:** This operation is used to report the status of the camera command.

**Namespace:** UMAA::SEM::CameraSelectionControl

**Topic:** CameraSelectionCommandStatus

**Data Type:** CameraSelectionCommandStatusType

**Table 65:** CameraSelectionCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.17.3 setCameraSelection

**Description:** This operation is used to select the camera with the associated multiplexer.

**Namespace:** UMAA::SEM::CameraSelectionControl

**Topic:** CameraSelectionCommand

**Data Type:** CameraSelectionCommandType

**Table 66:** CameraSelectionCommandType Message Definition

| Attribute Name                                                    | Attribute Type              | Attribute Description                                       |
|-------------------------------------------------------------------|-----------------------------|-------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                             |                                                             |
| cameraID                                                          | <a href="#">NumericGUID</a> | An unique identification of the selecting camera.           |
| muxID*                                                            | <a href="#">NumericGUID</a> | An unique identification of the multiplexer in the vehicle. |

### 6.1.18 CameraSelectionSpecs

The purpose of this service is to report the capabilities of a camera on a particular multiplexer.

**Table 67:** CameraSelectionSpecs Operations

| Service Requests (Inputs)                   | Service Responses (Outputs)                |
|---------------------------------------------|--------------------------------------------|
| <a href="#">queryCameraSelectionSpecs</a> ⊕ | <a href="#">reportCameraSelectionSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.18.1 reportCameraSelectionSpecs

**Description:** This operation is used to report the capability of the camera with the associated multiplexer.

**Namespace:** [UMAA::SEM::CameraSelectionSpecs](#)

**Topic:** [CameraSelectionSpecsReport](#)

**Data Type:** [CameraSelectionSpecsReportType](#)

**Table 68:** CameraSelectionSpecsReportType Message Definition

| Attribute Name                                                    | Attribute Type              | Attribute Description                                         |
|-------------------------------------------------------------------|-----------------------------|---------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                             |                                                               |
| muxID                                                             | <a href="#">NumericGUID</a> | An unique identification for the multiplexers in the vehicle. |
| cameraID*                                                         | <a href="#">NumericGUID</a> | An unique identification of the selected camera.              |

### 6.1.19 CameraSelectionStatus

The purpose of this service is to report the current camera selection.

**Table 69:** CameraSelectionStatus Operations

| Service Requests (Inputs)              | Service Responses (Outputs)           |
|----------------------------------------|---------------------------------------|
| <a href="#">queryCameraSelection</a> ⊕ | <a href="#">reportCameraSelection</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.19.1 reportCameraSelection

**Description:** This operation is used to report the current selection of the camera with the associated multiplexer.

**Namespace:** UMAA::SEM::CameraSelectionStatus

**Topic:** CameraSelectionReport

**Data Type:** CameraSelectionReportType

**Table 70:** CameraSelectionReportType Message Definition

| Attribute Name                                                    | Attribute Type              | Attribute Description                                                                              |
|-------------------------------------------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                             |                                                                                                    |
| cameraID                                                          | <a href="#">NumericGUID</a> | An unique identification of the currently selected camera associated with the defined multiplexer. |
| muxID*                                                            | <a href="#">NumericGUID</a> | An unique identification for the multiplexers in the vehicle.                                      |

#### 6.1.20 CameraSpecs

The purpose of this service is to provide the capabilities of the camera on board of the vehicle.

**Table 71:** CameraSpecs Operations

| Service Requests (Inputs)                 | Service Responses (Outputs)       |
|-------------------------------------------|-----------------------------------|
| <a href="#">queryCameraSpecs</a> $\oplus$ | <a href="#">reportCameraSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.20.1 reportCameraSpecs

**Description:** This operation is used to report the capabilities of the camera.

**Namespace:** UMAA::SEM::CameraSpecs

**Topic:** CameraSpecsReport

**Data Type:** CameraSpecsReportType

**Table 72:** CameraSpecsReportType Message Definition

| Attribute Name                                                    | Attribute Type | Attribute Description |
|-------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                |                       |

| Attribute Name             | Attribute Type         | Attribute Description                                      |
|----------------------------|------------------------|------------------------------------------------------------|
| exposureModeAperture       | boolean                | The unsupported/supported exposure aperture priority mode. |
| exposureModeAuto           | boolean                | The unsupported/supported exposure auto mode.              |
| exposureModeManual         | boolean                | The unsupported/supported exposure manual mode.            |
| exposureModeShutter        | boolean                | The unsupported/supported exposure shutter priority mode.  |
| focusModeAuto              | boolean                | The unsupported/supported auto focus mode.                 |
| focusModeManual            | boolean                | The unsupported/supported manual focus mode.               |
| imageStabilization         | boolean                | The true/false image stabilization/vibration reduction.    |
| imagingModeColor           | boolean                | The unsupported/supported imaging color mode.              |
| imagingModeGreyscale       | boolean                | The unsupported/supported imaging greyscale mode.          |
| imagingModeInfrared        | boolean                | The unsupported/supported imaging infrared mode.           |
| imagingModeLowlight        | boolean                | The unsupported/supported imaging lowlight mode.           |
| lightSensitivityISO100     | boolean                | The unsupported/supported light sensitivity level.         |
| lightSensitivityISO1600    | boolean                | The unsupported/supported light sensitivity level.         |
| lightSensitivityISO200     | boolean                | The unsupported/supported light sensitivity level.         |
| lightSensitivityISO3200    | boolean                | The unsupported/supported light sensitivity level.         |
| lightSensitivityISO400     | boolean                | The unsupported/supported light sensitivity level.         |
| lightSensitivityISO800     | boolean                | The unsupported/supported light sensitivity level.         |
| lightSensitivityAuto       | boolean                | The unsupported/supported light sensitivity level.         |
| maxAperture                | ApertureDiameter       | The maximum aperture diameter.                             |
| maxFocalLength             | FocalLength            | The maximum focal length.                                  |
| maxShutterSpeed            | ShutterSpeed           | The maximum shutter speed.                                 |
| meteringModeAuto           | boolean                | The unsupported/supported exposure metering auto mode.     |
| meteringModeCenterWeighted | boolean                | The unsupported/supported exposure metering manual mode.   |
| meteringModeSpot           | boolean                | The unsupported/supported exposure metering spot mode.     |
| minAperture                | ApertureDiameter       | The minimum aperture diameter.                             |
| minFocalLength             | FocalLength            | The minimum focal length.                                  |
| minShutterSpeed            | ShutterSpeed           | The minimum shutter speed.                                 |
| name                       | StringShortDescription | Description of the camera.                                 |
| stateActive                | boolean                | The unsupported/supported active state.                    |
| stateOff                   | boolean                | The unsupported/supported off state.                       |
| stateStandby               | boolean                | The unsupported/supported standby state.                   |
| whiteBalanceAuto           | boolean                | The unsupported/supported auto white balance.              |
| whiteBalanceCloudy         | boolean                | The unsupported/supported cloudy white balance.            |
| whiteBalanceDaylight       | boolean                | The unsupported/supported daylight white balance.          |
| whiteBalanceFlash          | boolean                | The unsupported/supported flash white balance.             |
| whiteBalanceFluorescent    | boolean                | The unsupported/supported fluorescent white balance.       |
| whiteBalanceShade          | boolean                | The unsupported/supported shade white balance.             |

| Attribute Name       | Attribute Type          | Attribute Description                             |
|----------------------|-------------------------|---------------------------------------------------|
| whiteBalanceTungsten | <a href="#">boolean</a> | The unsupported/supported tungsten white balance. |
| zoomModeAnalog       | <a href="#">boolean</a> | The unsupported/supported zoom AnalogOnly mode.   |
| zoomModeDigital      | <a href="#">boolean</a> | The unsupported/supported zoom DigitalOnly mode.  |
| zoomModeMixed        | <a href="#">boolean</a> | The unsupported/supported zoom mixed mode.        |
| zoomModeOff          | <a href="#">boolean</a> | The unsupported/supported None zoom mode.         |

### 6.1.21 CameraStatus

The purpose of this service is to provide the status of the camera on board of the vehicle.

**Table 73:** CameraStatus Operations

| Service Requests (Inputs)     | Service Responses (Outputs)  |
|-------------------------------|------------------------------|
| <a href="#">queryCamera</a> ⊕ | <a href="#">reportCamera</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.21.1 reportCamera

**Description:** This operation is used to report the current status of the camera.

**Namespace:** UMAA::SEM::CameraStatus

**Topic:** CameraReport

**Data Type:** CameraReportType

**Table 74:** CameraReportType Message Definition

| Attribute Name                                                    | Attribute Type                     | Attribute Description                     |
|-------------------------------------------------------------------|------------------------------------|-------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                    |                                           |
| filtered                                                          | <a href="#">boolean</a>            | The current image filtered.               |
| imageCenterLocation                                               | <a href="#">GeoPosition2D</a>      | The current center location of the image. |
| mode                                                              | <a href="#">IRPolarityEnumType</a> | The current image polarity of the camera. |

### 6.1.22 CommsLostPolicy

The purpose of this service is to provide a mechanism to retrieve the vehicle communication system's capability and configuration and for setting the behavior for a lost communication event.

**Table 75:** CommsLostPolicy Operations

| Service Requests (Inputs)       | Service Responses (Outputs)               |
|---------------------------------|-------------------------------------------|
| setCommsLostPolicy              | reportCommsLostPolicyCommandStatus        |
| queryCommsLostPolicyCommandAck⊕ | reportCommsLostPolicyCommandAck           |
| cancelCommsLostPolicyCommand⊕   | reportCommsLostPolicyCancelCommandStatus⊕ |
| queryCommsLostPolicy⊕           | reportCommsLostPolicy                     |
| queryCommsLostPolicyConfig⊕     | reportCommsLostPolicyConfig               |
| queryCommsLostPolicySpecs⊕      | reportCommsLostPolicySpecs                |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.22.1 reportCommsLostPolicy

**Description:** This operation is used to report the current lost communication status of the vehicle.

**Namespace:** UMAA::MM::CommsLostPolicy

**Topic:** CommsLostPolicyReport

**Data Type:** CommsLostPolicyReportType

**Table 76:** CommsLostPolicyReportType Message Definition

| Attribute Name                                                    | Attribute Type                          | Attribute Description                  |
|-------------------------------------------------------------------|-----------------------------------------|----------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                         |                                        |
| status                                                            | <a href="#">LostCommsStatusEnumType</a> | The policy status and execution state. |

#### 6.1.22.2 reportCommsLostPolicyCommandAck

**Description:** This operation is used to provide the CommsLostPolicy commanded values.

**Namespace:** UMAA::MM::CommsLostPolicy

**Topic:** CommsLostPolicyCommandAckReport

**Data Type:** CommsLostPolicyCommandAckReportType

**Table 77:** CommsLostPolicyCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                             | Attribute Description |
|-----------------------------------------------------------------------------|--------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                            |                       |
| command                                                                     | <a href="#">CommsLostPolicyCommandType</a> | The source command.   |

### 6.1.22.3 reportCommsLostPolicyCommandStatus

**Description:** This operation is used to report a response whether the vehicle support the lost communication behaviors.

**Namespace:** UMAA::MM::CommsLostPolicy

**Topic:** CommsLostPolicyCommandStatus

**Data Type:** CommsLostPolicyCommandStatusType

**Table 78:** CommsLostPolicyCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.22.4 reportCommsLostPolicyConfig

**Description:** This operation is used to report the current lost communication configuration of the vehicle.

**Namespace:** UMAA::MM::CommsLostPolicy

**Topic:** CommsLostPolicyConfigReport

**Data Type:** CommsLostPolicyConfigReportType

**Table 79:** CommsLostPolicyConfigReportType Message Definition

| Attribute Name                                                  | Attribute Type                          | Attribute Description                                                                         |
|-----------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                         |                                                                                               |
| commsLostTimeOut                                                | <a href="#">DurationSeconds</a>         | Time of no contact after which communication is considered lost and the policy is initiated.  |
| commsRegainedStop                                               | <a href="#">boolean</a>                 | If true, the robot will stop when comms are regained. Otherwise it will do nothing.           |
| commsRegainedTimeOut                                            | <a href="#">DurationSeconds</a>         | Time of communication with previously controlling client to consider communications regained. |
| continueMission†                                                | <a href="#">boolean</a>                 | If present, the robot will continue its mission when comms are lost.                          |
| moveToPos†                                                      | <a href="#">MoveToPosPolicyType</a>     | If present, the robot will move to a specific position when comms are lost.                   |
| retrotraverse†                                                  | <a href="#">RetrotraversePolicyType</a> | If present, the robot will retrotraverse as specified when comms are lost.                    |
| stopMotion†                                                     | <a href="#">boolean</a>                 | If present, the robot will stop moving when comms are lost.                                   |

**6.1.22.5 reportCommsLostPolicySpecs**

**Description:** This operation is used to report the lost communication capability of the vehicle.

**Namespace:** UMAA::MM::CommsLostPolicy

**Topic:** CommsLostPolicySpecsReport

**Data Type:** CommsLostPolicySpecsReportType

**Table 80:** CommsLostPolicySpecsReportType Message Definition

| Attribute Name                                                    | Attribute Type          | Attribute Description                                   |
|-------------------------------------------------------------------|-------------------------|---------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                         |                                                         |
| continueMission                                                   | <a href="#">boolean</a> | Flag indicating support for continue policy.            |
| moveToPose                                                        | <a href="#">boolean</a> | Flag indicating support for move to pose policy.        |
| retroTraverse                                                     | <a href="#">boolean</a> | Flag indicating support for retrograde traverse policy. |
| stop                                                              | <a href="#">boolean</a> | Flag indicating support for stop policy.                |

**6.1.22.6 setCommsLostPolicy**

**Description:** This operation is used to set the active behavior for lost communication event for the vehicle.

**Namespace:** UMAA::MM::CommsLostPolicy

**Topic:** CommsLostPolicyCommand

**Data Type:** CommsLostPolicyCommandType

**Table 81:** CommsLostPolicyCommandType Message Definition

| Attribute Name                                                    | Attribute Type                          | Attribute Description                                                                         |
|-------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                         |                                                                                               |
| commsLostTimeOut                                                  | <a href="#">DurationSeconds</a>         | Time of no contact after which communication is considered lost and the policy is initiated.  |
| commsRegainedStop                                                 | <a href="#">boolean</a>                 | If true, the robot will stop when comms are regained. Otherwise it will do nothing.           |
| commsRegainedTimeOut                                              | <a href="#">DurationSeconds</a>         | Time of communication with previously controlling client to consider communications regained. |
| continueMission†                                                  | <a href="#">boolean</a>                 | If present, the robot will continue its mission when comms are lost.                          |
| moveToPos†                                                        | <a href="#">MoveToPosPolicyType</a>     | If present, the robot will move to a specific position when comms are lost.                   |
| retrotraverse†                                                    | <a href="#">RetrotraversePolicyType</a> | If present, the robot will retrotraverse as specified when comms are lost.                    |
| stopMotion†                                                       | <a href="#">boolean</a>                 | If present, the robot will stop moving when comms are lost.                                   |

### 6.1.23 CompartmentConfig

The purpose of this service is to provide the identification of the compartment sensors.

**Table 82:** CompartmentConfig Operations

| Service Requests (Inputs)                | Service Responses (Outputs)             |
|------------------------------------------|-----------------------------------------|
| <a href="#">queryCompartmentConfig</a> ⊕ | <a href="#">reportCompartmentConfig</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.23.1 reportCompartmentConfig

**Description:** This operation is used to report the identification of the compartment sensors on the vehicle.

**Namespace:** UMAA::SA::CompartmentConfig

**Topic:** CompartmentConfigReport

**Data Type:** CompartmentConfigReportType

**Table 83:** CompartmentConfigReportType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description        |
|-------------------------------------------------------------------|----------------------------------------|------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                        |                              |
| name                                                              | <a href="#">StringShortDescription</a> | The name of the compartment. |

### 6.1.24 CompartmentStatus

The purpose of this service is to report the status of the compartment sensors (temperature, humidity, flood and leak detection) on the vehicle.

**Table 84:** CompartmentStatus Operations

| Service Requests (Inputs)          | Service Responses (Outputs)       |
|------------------------------------|-----------------------------------|
| <a href="#">queryCompartment</a> ⊕ | <a href="#">reportCompartment</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.24.1 reportCompartment

**Description:** This operation is used to report the current status of the compartment sensors on the vehicle.

**Namespace:** UMAA::SA::CompartmentStatus

**Topic:** CompartmentReport

**Data Type:** CompartmentReportType

**Table 85:** CompartmentReportType Message Definition

| Attribute Name                                                  | Attribute Type                   | Attribute Description                         |
|-----------------------------------------------------------------|----------------------------------|-----------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                  |                                               |
| floodDetected                                                   | <a href="#">boolean</a>          | The response from the flood detection system. |
| humidity                                                        | <a href="#">RelativeHumidity</a> | The humidity of the compartment.              |
| leakDetected                                                    | <a href="#">boolean</a>          | The response from the leak detection system.  |
| temperature                                                     | <a href="#">Temperature</a>      | The temperature of the compartment.           |

### 6.1.25 ContactCategoryReport

This service identifies the category (and associated confidence in that category) of a track for a reported contact.

**Table 86:** ContactCategoryReport Operations

| Service Requests (Inputs)              | Service Responses (Outputs)           |
|----------------------------------------|---------------------------------------|
| <a href="#">queryContactCategory</a> ⊕ | <a href="#">reportContactCategory</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.25.1 reportContactCategory

**Description:** This operation is a response to retrieve the category (and associated confidence in that category) of a track for a reported contact.

**Namespace:** UMAA::SA::ContactCategoryReport

**Topic:** ContactCategoryReport

**Data Type:** ContactCategoryReportType

**Table 87:** ContactCategoryReportType Message Definition

| Attribute Name                                                  | Attribute Type                        | Attribute Description                                       |
|-----------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                       |                                                             |
| confidence                                                      | <a href="#">Percent</a>               | The confidence in the visual classification of the contact. |
| category*                                                       | <a href="#">TrackCategoryEnumType</a> | Indicates the type of track, by category.                   |
| contactID*                                                      | <a href="#">NumericGUID</a>           | An identifier of the contact.                               |

### 6.1.26 ContactFilterConfig

The purpose of this service is to provide a specialized filter that can be used to manage volume for contact reports for external transfer. Enables publishing per configuration information in order to be able to manage comms link bandwidth.

**Table 88:** ContactFilterConfig Operations

| Service Requests (Inputs)            | Service Responses (Outputs)                           |
|--------------------------------------|-------------------------------------------------------|
| setContactFilterConfig               | reportContactFilterConfigCommandStatus                |
| cancelContactFilterConfig $\oplus$   | reportContactFilterCancelConfigCommandStatus $\oplus$ |
| queryContactFilterConfigAck $\oplus$ | reportContactFilterConfigAck                          |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.26.1 reportContactFilterConfigAck

**Description:** This operation is used to report the current ContactFilter configuration.

**Namespace:** UMAA::SA::ContactFilterConfig

**Topic:** ContactFilterConfigAckReport

**Data Type:** ContactFilterConfigAckReportType

**Table 89:** ContactFilterConfigAckReportType Message Definition

| Attribute Name                                                  | Attribute Type                                 | Attribute Description     |
|-----------------------------------------------------------------|------------------------------------------------|---------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                                |                           |
| config                                                          | <a href="#">ContactFilterConfigCommandType</a> | The source configuration. |

#### 6.1.26.2 reportContactFilterConfigCommandStatus

**Description:** This operation is used to provide the status of the current ContactFilterConfig command.

**Namespace:** UMAA::SA::ContactFilterConfig

**Topic:** ContactFilterConfigCommandStatus

**Data Type:** ContactFilterConfigCommandStatusType

**Table 90:** ContactFilterConfigCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.26.3 setContactFilterConfig

**Description:** This operation is used to add a new contact filter configuration.

**Namespace:** UMAA::SA::ContactFilterConfig

**Topic:** ContactFilterConfigCommand

**Data Type:** ContactFilterConfigCommandType

**Table 91:** ContactFilterConfigCommandType Message Definition

| Attribute Name                                                    | Attribute Type                  | Attribute Description                                                                                                         |
|-------------------------------------------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                 |                                                                                                                               |
| bearingChangeLimit                                                | <a href="#">Angle</a>           | Specifies to only report if contact bearing change estimate change exceeds this value.                                        |
| headingChangeLimit                                                | <a href="#">Angle</a>           | Specifies to only report if contact heading change estimate change exceeds this value.                                        |
| noChangeTimerUpdate                                               | <a href="#">DurationSeconds</a> | Specifies to only report if no change for this amount of time, report timeStamp update so contact is still considered active. |
| positionChangeLimit                                               | <a href="#">Distance</a>        | Specifies to only report if contact distance change estimate exceeds this value.                                              |
| rangeChangeLimit                                                  | <a href="#">Distance</a>        | Specifies to only report if contact range change estimate change exceeds this value.                                          |
| speedChangeLimit                                                  | <a href="#">GroundSpeed</a>     | Specifies to only report if contact speed change estimate exceeds this value.                                                 |
| withinRangeofOwnship                                              | <a href="#">Distance</a>        | Specifies to only report if contact distance from ownship estimate is less than that value.                                   |
| messageFilterID*                                                  | <a href="#">NumericGUID</a>     | The identifier of the message filter.                                                                                         |

### 6.1.27 ContactIdentityReport

This service identifies the identity (and associated confidence in that identity) of a track for a reported contact.

**Table 92:** ContactIdentityReport Operations

| Service Requests (Inputs)              | Service Responses (Outputs)           |
|----------------------------------------|---------------------------------------|
| <a href="#">queryContactIdentity</a> ⊕ | <a href="#">reportContactIdentity</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.27.1 reportContactIdentity

**Description:** This operation is a response to retrieve the identity (and associated confidence in that identity) of a track for a reported contact.

**Namespace:** UMAA::SA::ContactIdentityReport

**Topic:** ContactIdentityReport

**Data Type:** ContactIdentityReportType

**Table 93:** ContactIdentityReportType Message Definition

| Attribute Name                                                    | Attribute Type                        | Attribute Description                                       |
|-------------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                       |                                                             |
| confidence                                                        | <a href="#">Percent</a>               | The confidence in the visual classification of the contact. |
| contactID*                                                        | <a href="#">NumericGUID</a>           | An identifier of the contact.                               |
| identity*                                                         | <a href="#">TrackIdentityEnumType</a> | The current identity of the contact track.                  |

### 6.1.28 ControlSystemID

The purpose of this service is to report the information of a control system and its client(s).

**Table 94:** ControlSystemID Operations

| Service Requests (Inputs)                        | Service Responses (Outputs)                                |
|--------------------------------------------------|------------------------------------------------------------|
| <a href="#">setControlSystemID</a>               | <a href="#">reportControlSystemIDCommandStatus</a>         |
| <a href="#">queryControlSystemIDCommandAck</a> ⊕ | <a href="#">reportControlSystemIDCommandAck</a>            |
| <a href="#">cancelControlSystemIDCommand</a> ⊕   | <a href="#">reportControlSystemIDCancelCommandStatus</a> ⊕ |
| <a href="#">queryControlSystemID</a> ⊕           | <a href="#">reportControlSystemID</a>                      |
| <a href="#">queryClientID</a> ⊕                  | <a href="#">reportClientID</a>                             |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.28.1 reportClientID

**Description:** This operation is used to report the information of client(s) within a control system.

**Namespace:** UMAA::MM::ControlSystemID

**Topic:** ClientIDReport

**Data Type:** ClientIDReportType

**Table 95:** ClientIDReportType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                                      |
|-------------------------------------------------------------------|----------------------------------------|------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                        |                                                            |
| name                                                              | <a href="#">StringShortDescription</a> | A name to describe a user or a subset of a control system. |

### 6.1.28.2 reportControlSystemID

**Description:** This operation is used to report the information of a control system.

**Namespace:** UMAA::MM::ControlSystemID

**Topic:** ControlSystemIDReport

**Data Type:** ControlSystemIDReportType

**Table 96:** ControlSystemIDReportType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                                     |
|-------------------------------------------------------------------|----------------------------------------|-----------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                        |                                                           |
| name                                                              | <a href="#">StringShortDescription</a> | A name to describe a control station or a control system. |

### 6.1.28.3 reportControlSystemIDCommandAck

**Description:** This operation is used to provide the ControlSystemID commanded values.

**Namespace:** UMAA::MM::ControlSystemID

**Topic:** ControlSystemIDCommandAckReport

**Data Type:** ControlSystemIDCommandAckReportType

**Table 97:** ControlSystemIDCommandAckReportType Message Definition

| Attribute Name                                                               | Attribute Type                             | Attribute Description |
|------------------------------------------------------------------------------|--------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACCommandStatusBase</a> |                                            |                       |
| command                                                                      | <a href="#">ControlSystemIDCommandType</a> | The source command.   |

### 6.1.28.4 reportControlSystemIDCommandStatus

**Description:** This operation is used to report the status of the set control system ID command.

**Namespace:** UMAA::MM::ControlSystemID

**Topic:** ControlSystemIDCommandStatus

**Data Type:** ControlSystemIDCommandStatusType

**Table 98:** ControlSystemIDCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.28.5 setControlSystemID**

**Description:** This operation is used to set the control system ID for an service that might not know it.

**Namespace:** UMAA::MM::ControlSystemID

**Topic:** ControlSystemIDCommand

**Data Type:** ControlSystemIDCommandType

**Table 99:** ControlSystemIDCommandType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description           |
|-------------------------------------------------------------------|----------------------------------------|---------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                        |                                 |
| name                                                              | <a href="#">StringShortDescription</a> | The name of the control system. |

**6.1.29 ControlTransfer**

The purpose of this service is to control and manage ownership of a vehicle, a system, or a payload.

**Table 100:** ControlTransfer Operations

| Service Requests (Inputs)                    | Service Responses (Outputs)                 |
|----------------------------------------------|---------------------------------------------|
| <a href="#">queryClientControl</a> ⊕         | <a href="#">reportClientControl</a>         |
| <a href="#">queryControlSystemControl</a> ⊕  | <a href="#">reportControlSystemControl</a>  |
| <a href="#">queryControlSystemTransfer</a> ⊕ | <a href="#">reportControlSystemTransfer</a> |
| <a href="#">queryControlTransfer</a> ⊕       | <a href="#">reportControlTransfer</a>       |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

**6.1.29.1 reportClientControl**

**Description:** This operation is used to report which client within the control system is in control of a vehicle, a system or a payload.

**Namespace:** UMAA::MM::ControlTransfer

**Topic:** ClientControlReport

**Data Type:** ClientControlReportType

**Table 101:** ClientControlReportType Message Definition

| Attribute Name                                                    | Attribute Type                                   | Attribute Description                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                                  |                                                                                                                                                                                                                                                                    |
| authorityLevel                                                    | <a href="#">Count</a>                            | Value between 0 and 255 with 0 indicating no control and 255 being root access. The control arbiter may use this value to automatically force a control release or this value may be displayed to the controlling client user as an indication of control urgency. |
| clientID                                                          | <a href="#">NumericGUID</a>                      | A unique identification of an operator or a subsystem that controls the vehicle or a payload. However, if status is AVAILABLE, clientID should not be set.                                                                                                         |
| status                                                            | <a href="#">ResourceAllocationStatusEnumType</a> | A control status of the vehicle, a system or a payload.                                                                                                                                                                                                            |

**6.1.29.2 reportControlSystemControl**

**Description:** This operation is used to report which control system is in control of a vehicle, a system or a payload.

**Namespace:** UMAA::MM::ControlTransfer

**Topic:** ControlSystemControlReport

**Data Type:** ControlSystemControlReportType

**Table 102:** ControlSystemControlReportType Message Definition

| Attribute Name                                                    | Attribute Type                                   | Attribute Description                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                                  |                                                                                                                                                                                                                                                                    |
| authorityLevel                                                    | <a href="#">Count</a>                            | Value between 0 and 255 with 0 indicating no control and 255 being root access. The control arbiter may use this value to automatically force a control release or this value may be displayed to the controlling client user as an indication of control urgency. |
| controlSystemID                                                   | <a href="#">NumericGUID</a>                      | A unique identification of a system that controls the vehicle or a payload. However, if status is AVAILABLE, controlSystemID should not be set.                                                                                                                    |
| status                                                            | <a href="#">ResourceAllocationStatusEnumType</a> | A control status of the vehicle, a system or a payload.                                                                                                                                                                                                            |

**6.1.29.3 reportControlSystemTransfer**

**Description:** This operation is used to report a control request by a control system to control of a vehicle, a system or a payload.

**Namespace:** UMAA::MM::ControlTransfer

**Topic:** ControlSystemTransferReport

**Data Type:** ControlSystemTransferReportType

**Table 103:** ControlSystemTransferReportType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                        |                                                                                                                                                                                                                                                                    |
| authorityLevel                                                    | <a href="#">Count</a>                  | Value between 0 and 255 with 0 indicating no control and 255 being root access. The control arbiter may use this value to automatically force a control release or this value may be displayed to the controlling client user as an indication of control urgency. |
| result                                                            | <a href="#">HandoverResultEnumType</a> | The result of the handover.                                                                                                                                                                                                                                        |

#### 6.1.29.4 reportControlTransfer

**Description:** This operation is used to report a control request by a client to control of a vehicle, a system or a payload.

**Namespace:** UMAA::MM::ControlTransfer

**Topic:** ClientControlTransferReport

**Data Type:** ClientControlTransferReportType

**Table 104:** ClientControlTransferReportType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                        |                                                                                                                                                                                                                                                                    |
| authorityLevel                                                    | <a href="#">Count</a>                  | Value between 0 and 255 with 0 indicating no control and 255 being root access. The control arbiter may use this value to automatically force a control release or this value may be displayed to the controlling client user as an indication of control urgency. |
| result                                                            | <a href="#">HandoverResultEnumType</a> | The result of the handover.                                                                                                                                                                                                                                        |

#### 6.1.30 DigitalAudioConfig

The purpose of this service is to provide a means of configuring a digital audio stream, often from a microphone or other source. Note that the transport of the digitized audio stream itself is not covered by this service, and may use existing audio networking standards such as Real Time Streaming Protocol (RTSP).

**Table 105:** DigitalAudioConfig Operations

| Service Requests (Inputs)                 | Service Responses (Outputs)              |
|-------------------------------------------|------------------------------------------|
| <a href="#">queryDigitalAudioConfig</a> ⊕ | <a href="#">reportDigitalAudioConfig</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.30.1 [reportDigitalAudioConfig](#)

**Description:** This operation is used to report the configuration of a digital audio stream.

**Namespace:** UMAA::SEM::DigitalAudioConfig

**Topic:** DigitalAudioConfigReport

**Data Type:** DigitalAudioConfigReportType

**Table 106:** DigitalAudioConfigReportType Message Definition

| Attribute Name                                                  | Attribute Type                               | Attribute Description                                         |
|-----------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                              |                                                               |
| bitDepth                                                        | <a href="#">BitDepthEnumType</a>             | Audio stream bit depth.                                       |
| digitalFormat                                                   | <a href="#">DigitalAudioFormatEnumType</a>   | Audio encoding format.                                        |
| encodingQuality                                                 | <a href="#">AudioEncodingQualityEnumType</a> | Audio quality setting.                                        |
| maxBitRate                                                      | <a href="#">CommsRateBitsPerSecond</a>       | The maximum bit rate.                                         |
| minBitRate                                                      | <a href="#">CommsRateBitsPerSecond</a>       | The minimum bit rate.                                         |
| numberOfChannels                                                | <a href="#">Count</a>                        | Number of audio channels to be sent to Annunciator in stream. |
| sampleRate                                                      | <a href="#">Count</a>                        | The sample rate.                                              |
| sensitivity                                                     | <a href="#">DigitalAudioSensitivityCount</a> | The sensitivity as a percentage.                              |

#### 6.1.31 [DigitalAudioSpecs](#)

The purpose of this service is to provide a means to request the capabilities of a digital audio stream, often from a microphone or other source. Note that the transport of the digitized audio stream itself is not covered by this service, and may use existing audio networking standards such as Real Time Streaming Protocol (RTSP).

**Table 107:** DigitalAudioSpecs Operations

| Service Requests (Inputs)                | Service Responses (Outputs)             |
|------------------------------------------|-----------------------------------------|
| <a href="#">queryDigitalAudioSpecs</a> ⊕ | <a href="#">reportDigitalAudioSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

### 6.1.31.1 reportDigitalAudioSpecs

**Description:** This operation is used to report the capabilities of a digital audio stream.

**Namespace:** UMAA::SEM::DigitalAudioSpecs

**Topic:** DigitalAudioSpecsReport

**Data Type:** DigitalAudioSpecsReportType

**Table 108:** DigitalAudioSpecsReportType Message Definition

| Attribute Name                                                  | Attribute Type                         | Attribute Description                                  |
|-----------------------------------------------------------------|----------------------------------------|--------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                        |                                                        |
| maxAllowedBitRate                                               | <a href="#">CommsRateBitsPerSecond</a> | The maximum allowed bit rate.                          |
| maxChannels                                                     | <a href="#">Count</a>                  | The maximum number of audio channels supported.        |
| maxSampleRate                                                   | <a href="#">Count</a>                  | The maximum available sample rate.                     |
| minAllowedBitRate                                               | <a href="#">CommsRateBitsPerSecond</a> | The minimum allowed bit rate.                          |
| minSampleRate                                                   | <a href="#">Count</a>                  | The minimum available sample rate.                     |
| supported10bits                                                 | <a href="#">boolean</a>                | The supported/unsupported digital audio bit depth.     |
| supported12bits                                                 | <a href="#">boolean</a>                | The supported/unsupported digital audio bit depth.     |
| supported14bits                                                 | <a href="#">boolean</a>                | The supported/unsupported digital audio bit depth.     |
| supported16bits                                                 | <a href="#">boolean</a>                | The supported/unsupported digital audio bit depth.     |
| supported20bits                                                 | <a href="#">boolean</a>                | The supported/unsupported digital audio bit depth.     |
| supported24bits                                                 | <a href="#">boolean</a>                | The supported/unsupported digital audio bit depth.     |
| supported32bits                                                 | <a href="#">boolean</a>                | The supported/unsupported digital audio bit depth.     |
| supported40bits                                                 | <a href="#">boolean</a>                | The supported/unsupported digital audio bit depth.     |
| supported48bits                                                 | <a href="#">boolean</a>                | The supported/unsupported digital audio bit depth.     |
| supported56bits                                                 | <a href="#">boolean</a>                | The supported/unsupported digital audio bit depth.     |
| supported64bits                                                 | <a href="#">boolean</a>                | The supported/unsupported digital audio bit depth.     |
| supported8bits                                                  | <a href="#">boolean</a>                | The supported/unsupported digital audio bit depth.     |
| supportedAACMPEG2                                               | <a href="#">boolean</a>                | The supported/unsupported digital audio format.        |
| supportedAACMPEG4                                               | <a href="#">boolean</a>                | The supported/unsupported digital audio format.        |
| supportedAIFF                                                   | <a href="#">boolean</a>                | The supported/unsupported digital audio format.        |
| supportedALAC                                                   | <a href="#">boolean</a>                | The supported/unsupported digital audio format.        |
| supportedAverage                                                | <a href="#">boolean</a>                | The supported/unsupported digital audio quality level. |
| supportedBest                                                   | <a href="#">boolean</a>                | The supported/unsupported digital audio quality level. |
| supportedBetter                                                 | <a href="#">boolean</a>                | The supported/unsupported digital audio quality level. |
| supportedDolbyDigital                                           | <a href="#">boolean</a>                | The supported/unsupported digital audio format.        |
| supportedDTS                                                    | <a href="#">boolean</a>                | The supported/unsupported digital audio format.        |
| supportedFLAC                                                   | <a href="#">boolean</a>                | The supported/unsupported digital audio format.        |
| supportedGood                                                   | <a href="#">boolean</a>                | The supported/unsupported digital audio quality level. |

| Attribute Name        | Attribute Type | Attribute Description                                  |
|-----------------------|----------------|--------------------------------------------------------|
| supportedLess         | boolean        | The supported/unsupported digital audio quality level. |
| supportedLPCMPCM      | boolean        | The supported/unsupported digital audio format.        |
| supportedMP2          | boolean        | The supported/unsupported digital audio format.        |
| supportedMP3          | boolean        | The supported/unsupported digital audio format.        |
| supportedPoor         | boolean        | The supported/unsupported digital audio quality level. |
| supportedRealAudio    | boolean        | The supported/unsupported digital audio format.        |
| supportedSpeex        | boolean        | The supported/unsupported digital audio format.        |
| supportedTrueAudio    | boolean        | The supported/unsupported digital audio format.        |
| supportedULAW         | boolean        | The supported/unsupported digital audio format.        |
| supportedVORBIS       | boolean        | The supported/unsupported digital audio format.        |
| supportedWAV          | boolean        | The supported/unsupported digital audio format.        |
| supportedWMA          | boolean        | The supported/unsupported digital audio format.        |
| supportedWMA9Lossless | boolean        | The supported/unsupported digital audio format.        |
| supportedWorst        | boolean        | The supported/unsupported digital audio quality level. |

### 6.1.32 DigitalAudioStreamControl

The purpose of this service is to allow a client to specify an RTSP stream as an audio source.

**Table 109:** DigitalAudioStreamControl Operations

| Service Requests (Inputs)                  | Service Responses (Outputs)                          |
|--------------------------------------------|------------------------------------------------------|
| setDigitalAudioStream                      | reportDigitalAudioStreamCommandStatus                |
| queryDigitalAudioStreamCommandAck $\oplus$ | reportDigitalAudioStreamCommandAck                   |
| cancelDigitalAudioStreamCommand $\oplus$   | reportDigitalAudioStreamCancelCommandStatus $\oplus$ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.32.1 reportDigitalAudioStreamCommandAck

**Description:** This operation is used to report the current command that set the source of a digital audio stream.

**Namespace:** UMAA::SEM::DigitalAudioStreamControl

**Topic:** DigitalAudioStreamCommandAckReport

**Data Type:** DigitalAudioStreamCommandAckReportType

**Table 110:** DigitalAudioStreamCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                                | Attribute Description |
|-----------------------------------------------------------------------------|-----------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                               |                       |
| command                                                                     | <a href="#">DigitalAudioStreamCommandType</a> | The source command.   |

**6.1.32.2 reportDigitalAudioStreamCommandStatus**

**Description:** This operation is used to report the status of the command that set the source of a digital audio stream.

**Namespace:** UMAA::SEM::DigitalAudioStreamControl

**Topic:** DigitalAudioStreamCommandStatus

**Data Type:** DigitalAudioStreamCommandStatusType

**Table 111:** DigitalAudioStreamCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.32.3 setDigitalAudioStream**

**Description:** This operation is used to set the source of a digital audio stream.

**Namespace:** UMAA::SEM::DigitalAudioStreamControl

**Topic:** DigitalAudioStreamCommand

**Data Type:** DigitalAudioStreamCommandType

**Table 112:** DigitalAudioStreamCommandType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                                                                                                                    |
|-------------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                        |                                                                                                                                          |
| repeat                                                            | <a href="#">boolean</a>                | The on/off value indicating if a finite stream should be replayed once it finishes (true == repeat until new stream is specified).       |
| url                                                               | <a href="#">StringShortDescription</a> | The URL source of the stream. This URL should not require a DNS to resolve; hence, and IP address should be substituted for a host name. |

### 6.1.33 DigitalAudioStreamStatus

The purpose of this service is to allow a client to request the source of digital audio stream.

**Table 113:** DigitalAudioStreamStatus Operations

| Service Requests (Inputs)                 | Service Responses (Outputs)              |
|-------------------------------------------|------------------------------------------|
| <a href="#">queryDigitalAudioStream</a> ⊕ | <a href="#">reportDigitalAudioStream</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.33.1 reportDigitalAudioStream

**Description:** This operation is used to report the source of a digital audio stream.

**Namespace:** UMAA::SEM::DigitalAudioStreamStatus

**Topic:** DigitalAudioStreamReport

**Data Type:** DigitalAudioStreamReportType

**Table 114:** DigitalAudioStreamReportType Message Definition

| Attribute Name                                                  | Attribute Type                         | Attribute Description                                                                                                                    |
|-----------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                        |                                                                                                                                          |
| repeat                                                          | <a href="#">boolean</a>                | The on/off value indicating if a finite stream should be replayed once it finishes (true == repeat until new stream is specified).       |
| url                                                             | <a href="#">StringShortDescription</a> | The URL source of the stream. This URL should not require a DNS to resolve; hence, and IP address should be substituted for a host name. |

### 6.1.34 DigitalVideoConfig

The purpose of this service is to provide access to the configuration of the digital camera.

**Table 115:** DigitalVideoConfig Operations

| Service Requests (Inputs)                 | Service Responses (Outputs)              |
|-------------------------------------------|------------------------------------------|
| <a href="#">queryDigitalVideoConfig</a> ⊕ | <a href="#">reportDigitalVideoConfig</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.34.1 reportDigitalVideoConfig

**Description:** This operation is used to report the configuration of the digital video sensor.

**Namespace:** UMAA::SEM::DigitalVideoConfig

**Topic:** DigitalVideoConfigReport

**Data Type:** DigitalVideoConfigReportType

**Table 116:** DigitalVideoConfigReportType Message Definition

| Attribute Name                                                  | Attribute Type                             | Attribute Description                                      |
|-----------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                            |                                                            |
| commsProtocol                                                   | <a href="#">NetworkProtocolEnumType</a>    | The current communications protocol.                       |
| commsRate                                                       | <a href="#">CommsRateMegabitsPerSecond</a> | The current communications rate.                           |
| digitalVideoError                                               | <a href="#">DigitalSensorErrorType</a>     | Digital video error code and description.                  |
| format                                                          | <a href="#">DataEncodingEnumType</a>       | The current format of data encoding.                       |
| frameRate                                                       | <a href="#">FrameRateFPS</a>               | The current frame rate of a digital video stream.          |
| frameSize                                                       | <a href="#">FrameSizeEnumType</a>          | The current frame size of a digital video stream.          |
| IPAddress                                                       | <a href="#">StringShortDescription</a>     | The current IP address to access the digital video stream. |
| IPPort                                                          | <a href="#">IPPortCounting</a>             | The current IP port to access the digital video stream.    |
| maxBitRate                                                      | <a href="#">DataTransferRate</a>           | The current bit rate of a digital video stream.            |
| minBitRate                                                      | <a href="#">DataTransferRate</a>           | The current bit rate of a digital video stream.            |
| transportEncoding                                               | <a href="#">TransportEncodingEnumType</a>  | The current encoding method for transport.                 |
| URI                                                             | <a href="#">UniformResourceIdentifier</a>  | The current location of the digital video stream.          |

### 6.1.35 DigitalVideoControl

The purpose of this service is to provide access to control video and associated audio stream.

**Table 117:** DigitalVideoControl Operations

| Service Requests (Inputs)                     | Service Responses (Outputs)                             |
|-----------------------------------------------|---------------------------------------------------------|
| <a href="#">setDigitalVideo</a>               | <a href="#">reportDigitalVideoCommandStatus</a>         |
| <a href="#">queryDigitalVideoCommandAck</a> ⊕ | <a href="#">reportDigitalVideoCommandAck</a>            |
| <a href="#">cancelDigitalVideoCommand</a> ⊕   | <a href="#">reportDigitalVideoCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.35.1 reportDigitalVideoCommandAck

**Description:** This operation is used to report the current command to the digital video or audio sensor.

**Namespace:** UMAA::SEM::DigitalVideoControl

**Topic:** DigitalVideoCommandAckReport

**Data Type:** DigitalVideoCommandAckReportType

**Table 118:** DigitalVideoCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                          | Attribute Description |
|-----------------------------------------------------------------------------|-----------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                         |                       |
| command                                                                     | <a href="#">DigitalVideoCommandType</a> | The source command.   |

### 6.1.35.2 reportDigitalVideoCommandStatus

**Description:** This operation is used to report the status of the digital video command.

**Namespace:** UMAA::SEM::DigitalVideoControl

**Topic:** DigitalVideoCommandStatus

**Data Type:** DigitalVideoCommandStatusType

**Table 119:** DigitalVideoCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.35.3 setDigitalVideo

**Description:** This operation is used to set the configuration of a video or audio sensor.

**Namespace:** UMAA::SEM::DigitalVideoControl

**Topic:** DigitalVideoCommand

**Data Type:** DigitalVideoCommandType

**Table 120:** DigitalVideoCommandType Message Definition

| Attribute Name                                                    | Attribute Type                            | Attribute Description                                           |
|-------------------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                           |                                                                 |
| builtInTest†                                                      | <a href="#">BuiltInTestStatusEnumType</a> | Used to run a built-in test to the payload.                     |
| state                                                             | <a href="#">StreamStateEnumType</a>       | The desired state of the stream of the playback video or audio. |

### 6.1.36 DigitalVideoSpecs

The purpose of this service is to provide access to the capabilities of the digital camera.

**Table 121:** DigitalVideoSpecs Operations

| Service Requests (Inputs)                | Service Responses (Outputs)             |
|------------------------------------------|-----------------------------------------|
| <a href="#">queryDigitalVideoSpecs</a> ⊕ | <a href="#">reportDigitalVideoSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.36.1 reportDigitalVideoSpecs

**Description:** This operation is used to report the capabilities of a video sensor.

**Namespace:** UMAA::SEM::DigitalVideoSpecs

**Topic:** DigitalVideoSpecsReport

**Data Type:** DigitalVideoSpecsReportType

**Table 122:** DigitalVideoSpecsReportType Message Definition

| Attribute Name                                                  | Attribute Type                   | Attribute Description                               |
|-----------------------------------------------------------------|----------------------------------|-----------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                  |                                                     |
| maxBitRate                                                      | <a href="#">DataTransferRate</a> | The maximum bit rate of the digital video sensor.   |
| maxFrameRate                                                    | <a href="#">FrameRateFPS</a>     | The maximum frame rate of the digital video sensor. |
| minBitRate                                                      | <a href="#">DataTransferRate</a> | The minimum bit rate of the digital video sensor.   |
| minFrameRate                                                    | <a href="#">FrameRateFPS</a>     | The minimum frame rate of the digital video sensor. |
| supportedAVI                                                    | <a href="#">boolean</a>          | The unsupported/supported AVI format.               |
| supportedCGA320x200                                             | <a href="#">boolean</a>          | The unsupported/supported frame size.               |
| supportedCIF1408x1152                                           | <a href="#">boolean</a>          | The unsupported/supported frame size.               |
| supportedCIF352x288                                             | <a href="#">boolean</a>          | The unsupported/supported frame size.               |
| supportedCIF704x576                                             | <a href="#">boolean</a>          | The unsupported/supported frame size.               |
| supportedEGA640x350                                             | <a href="#">boolean</a>          | The unsupported/supported frame size.               |
| supportedH262                                                   | <a href="#">boolean</a>          | The unsupported/supported H_262 format.             |
| supportedH263                                                   | <a href="#">boolean</a>          | The unsupported/supported H_263 format.             |
| supportedH263PLUS                                               | <a href="#">boolean</a>          | The unsupported/supported H_263PLUS format.         |
| supportedH264                                                   | <a href="#">boolean</a>          | The unsupported/supported H_264 format.             |
| supportedHD10801920x1080                                        | <a href="#">boolean</a>          | The unsupported/supported frame size.               |
| supportedHD480852x480                                           | <a href="#">boolean</a>          | The unsupported/supported frame size.               |
| supportedHD7201280x720                                          | <a href="#">boolean</a>          | The unsupported/supported frame size.               |
| supportedHSXGA5120x4096                                         | <a href="#">boolean</a>          | The unsupported/supported frame size.               |
| supportedMJPEG                                                  | <a href="#">boolean</a>          | The unsupported/supported MJPEG format.             |
| supportedMPEG4                                                  | <a href="#">boolean</a>          | The unsupported/supported MPEG_4 format.            |

| Attribute Name           | Attribute Type | Attribute Description                 |
|--------------------------|----------------|---------------------------------------|
| supportedQCIF176x144     | boolean        | The unsupported/supported frame size. |
| supportedQQVGA160x120    | boolean        | The unsupported/supported frame size. |
| supportedQSXGA2560x2048  | boolean        | The unsupported/supported frame size. |
| supportedQVGA320x240     | boolean        | The unsupported/supported frame size. |
| supportedQXGA2048x1536   | boolean        | The unsupported/supported frame size. |
| supportedSQCIF128x96     | boolean        | The unsupported/supported frame size. |
| supportedSVGA800x600     | boolean        | The unsupported/supported frame size. |
| supportedSXGA1280x1024   | boolean        | The unsupported/supported frame size. |
| supportedUXGA1600x1200   | boolean        | The unsupported/supported frame size. |
| supportedVGA640x480      | boolean        | The unsupported/supported frame size. |
| supportedWHSXGA6400x4096 | boolean        | The unsupported/supported frame size. |
| supportedWHUXGA7680x4800 | boolean        | The unsupported/supported frame size. |
| supportedWOXGA2560x1600  | boolean        | The unsupported/supported frame size. |
| supportedWQSXGA3200x2048 | boolean        | The unsupported/supported frame size. |
| supportedWQUXGA3840x2400 | boolean        | The unsupported/supported frame size. |
| supportedWSXGA1600x1024  | boolean        | The unsupported/supported frame size. |
| supportedWUXGA1920x1200  | boolean        | The unsupported/supported frame size. |
| supportedWVGA852x480     | boolean        | The unsupported/supported frame size. |
| supportedWXGA1366x768    | boolean        | The unsupported/supported frame size. |
| supportedXGA1024x768     | boolean        | The unsupported/supported frame size. |

### 6.1.37 EmitterControl

The purpose of this service is to define the parameters needed for an unmanned vehicle to control the emission state of an emitter.

**Table 123:** EmitterControl Operations

| Service Requests (Inputs)       | Service Responses (Outputs)               |
|---------------------------------|-------------------------------------------|
| setEmitter                      | reportEmitterCommandStatus                |
| queryEmitterCommandAck $\oplus$ | reportEmitterCommandAck                   |
| cancelEmitterCommand $\oplus$   | reportEmitterCancelCommandStatus $\oplus$ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.37.1 reportEmitterCommandAck

**Description:** This operation is used to provide the Emitter commanded values.

**Namespace:** UMAA::SO::EmitterControl

**Topic:** EmitterCommandAckReport

**Data Type:** EmitterCommandAckReportType

**Table 124:** EmitterCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                     | Attribute Description |
|-----------------------------------------------------------------------------|------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                    |                       |
| command                                                                     | <a href="#">EmitterCommandType</a> | The source command.   |

### 6.1.37.2 reportEmitterCommandStatus

**Description:** This operation is used to report the status of the current Emitter command.

**Namespace:** UMAA::SO::EmitterControl

**Topic:** EmitterCommandStatus

**Data Type:** EmitterCommandStatusType

**Table 125:** EmitterCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.37.3 setEmitter

**Description:** This operation is used to set the Emitter command.

**Namespace:** UMAA::SO::EmitterControl

**Topic:** EmitterCommand

**Data Type:** EmitterCommandType

**Table 126:** EmitterCommandType Message Definition

| Attribute Name                                                    | Attribute Type           | Attribute Description                               |
|-------------------------------------------------------------------|--------------------------|-----------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                          |                                                     |
| endTime†                                                          | <a href="#">DateTime</a> | Defines the end time for the desired emitter level. |

| Attribute Name | Attribute Type                                  | Attribute Description              |
|----------------|-------------------------------------------------|------------------------------------|
| state          | <a href="#">EmitterOperationalStateEnumType</a> | Defines the desired emitter state. |
| emitterID*     | <a href="#">NumericGUID</a>                     | The ID of the emitter to control.  |

### 6.1.38 EmitterPresetConfig

The purpose of this service is to define the parameters needed for an unmanned vehicle to configure the emission levels.

**Table 127:** EmitterPresetConfig Operations

| Service Requests (Inputs)                     | Service Responses (Outputs)                                    |
|-----------------------------------------------|----------------------------------------------------------------|
| <a href="#">setEmitterPresetConfig</a>        | <a href="#">reportEmitterPresetConfigCommandStatus</a>         |
| <a href="#">cancelEmitterPresetConfig</a> ⊕   | <a href="#">reportEmitterPresetCancelConfigCommandStatus</a> ⊕ |
| <a href="#">queryEmitterPresetConfig</a> ⊕    | <a href="#">reportEmitterPresetConfig</a>                      |
| <a href="#">queryEmitterPresetConfigAck</a> ⊕ | <a href="#">reportEmitterPresetConfigAck</a>                   |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.38.1 reportEmitterPresetConfig

**Description:** This operation is used to report the current status of the EmitterPresetConfig service.

**Namespace:** UMAA::SO::EmitterPresetConfig

**Topic:** EmitterPresetConfigReport

**Data Type:** EmitterPresetConfigReportType

**Table 128:** EmitterPresetConfigReportType Message Definition

| Attribute Name                                                  | Attribute Type                          | Attribute Description                                                 |
|-----------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                         |                                                                       |
| levelName                                                       | <a href="#">StringShortDescription</a>  | Defines the EmitterPreset name for this level.                        |
| securedEmitterID                                                | sequence< <a href="#">NumericGUID</a> > | Defines the list of emitters set to the secured state for this level. |
| levelID*                                                        | <a href="#">NumericGUID</a>             | Defines the desired EmitterPreset level.                              |

#### 6.1.38.2 reportEmitterPresetConfigAck

**Description:** This operation is used to report the current EmitterPreset configuration.

**Namespace:** UMAA::SO::EmitterPresetConfig

**Topic:** EmitterPresetConfigAckReport

**Data Type:** EmitterPresetConfigAckReportType

**Table 129:** EmitterPresetConfigAckReportType Message Definition

| Attribute Name                                                    | Attribute Type                                 | Attribute Description     |
|-------------------------------------------------------------------|------------------------------------------------|---------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                                |                           |
| config                                                            | <a href="#">EmitterPresetConfigCommandType</a> | The source configuration. |

### 6.1.38.3 reportEmitterPresetConfigCommandStatus

**Description:** This operation is used to report the status of the current EmitterPresetConfig command.

**Namespace:** UMAA::SO::EmitterPresetConfig

**Topic:** EmitterPresetConfigCommandStatus

**Data Type:** EmitterPresetConfigCommandStatusType

**Table 130:** EmitterPresetConfigCommandStatusType Message Definition

| Attribute Name                                                           | Attribute Type | Attribute Description |
|--------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACCommandStatus</a> |                |                       |

### 6.1.38.4 setEmitterPresetConfig

**Description:** This operation is used to set the EmitterPresetConfig command.

**Namespace:** UMAA::SO::EmitterPresetConfig

**Topic:** EmitterPresetConfigCommand

**Data Type:** EmitterPresetConfigCommandType

**Table 131:** EmitterPresetConfigCommandType Message Definition

| Attribute Name                                                     | Attribute Type                          | Attribute Description                                                 |
|--------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACCommand</a> |                                         |                                                                       |
| levelName                                                          | <a href="#">StringShortDescription</a>  | Defines the EmitterPreset name for this level.                        |
| securedEmitterID                                                   | sequence< <a href="#">NumericGUID</a> > | Defines the list of emitters set to the secured state for this level. |
| levelID*                                                           | <a href="#">NumericGUID</a>             | Defines the desired EmitterPreset level.                              |

### 6.1.39 EmitterPresetControl

The purpose of this service is to define the parameters needed for an unmanned vehicle to control the emission level.

**Table 132:** EmitterPresetControl Operations

| Service Requests (Inputs)             | Service Responses (Outputs)                     |
|---------------------------------------|-------------------------------------------------|
| setEmitterPreset                      | reportEmitterPresetCommandStatus                |
| queryEmitterPresetCommandAck $\oplus$ | reportEmitterPresetCommandAck                   |
| cancelEmitterPresetCommand $\oplus$   | reportEmitterPresetCancelCommandStatus $\oplus$ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.39.1 reportEmitterPresetCommandAck

**Description:** This operation is used to provide the EmitterPreset commanded values.

**Namespace:** UMAA::SO::EmitterPresetControl

**Topic:** EmitterPresetCommandAckReport

**Data Type:** EmitterPresetCommandAckReportType

**Table 133:** EmitterPresetCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                           | Attribute Description |
|-----------------------------------------------------------------------------|------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                          |                       |
| command                                                                     | <a href="#">EmitterPresetCommandType</a> | The source command.   |

#### 6.1.39.2 reportEmitterPresetCommandStatus

**Description:** This operation is used to report the status of the current EmitterPreset command.

**Namespace:** UMAA::SO::EmitterPresetControl

**Topic:** EmitterPresetCommandStatus

**Data Type:** EmitterPresetCommandStatusType

**Table 134:** EmitterPresetCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.39.3 setEmitterPreset

**Description:** This operation is used to set the EmitterPreset command.

**Namespace:** UMAA::SO::EmitterPresetControl

**Topic:** EmitterPresetCommand

**Data Type:** EmitterPresetCommandType

**Table 135:** EmitterPresetCommandType Message Definition

| Attribute Name                                                    | Attribute Type              | Attribute Description                                     |
|-------------------------------------------------------------------|-----------------------------|-----------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                             |                                                           |
| endLevelID†                                                       | <a href="#">NumericGUID</a> | Defines the level to transition to when endTime expires.  |
| endTime†                                                          | <a href="#">DateTime</a>    | Defines the end time for the desired EmitterPreset level. |
| levelID                                                           | <a href="#">NumericGUID</a> | Defines the desired EmitterPreset level.                  |

### 6.1.40 EmitterPresetReport

The purpose of this service is to define the parameters needed for an unmanned vehicle to provide the emission level status.

**Table 136:** EmitterPresetReport Operations

| Service Requests (Inputs)            | Service Responses (Outputs)         |
|--------------------------------------|-------------------------------------|
| <a href="#">queryEmitterPreset</a> ⊕ | <a href="#">reportEmitterPreset</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.40.1 reportEmitterPreset

**Description:** This operation is used to report the current status of the EmitterPreset service.

**Namespace:** UMAA::SO::EmitterPresetReport

**Topic:** EmitterPresetReport

**Data Type:** EmitterPresetReportType

**Table 137:** EmitterPresetReportType Message Definition

| Attribute Name                                                   | Attribute Type              | Attribute Description                                                     |
|------------------------------------------------------------------|-----------------------------|---------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAAStatus</a> |                             |                                                                           |
| endLevelID†                                                      | <a href="#">NumericGUID</a> | Defines the current desired EmitterPreset level ID when the time expires. |

| Attribute Name | Attribute Type              | Attribute Description                                               |
|----------------|-----------------------------|---------------------------------------------------------------------|
| endTime†       | <a href="#">DateTime</a>    | Defines the end time for the desired EmitterPreset level.           |
| isModified     | <a href="#">boolean</a>     | Whether the level has been modified from its defined configuration. |
| levelID        | <a href="#">NumericGUID</a> | Defines the current EmitterPreset level ID.                         |

#### 6.1.41 EmitterReport

The purpose of this service is to define the parameters needed for an unmanned vehicle to provide the current emission state of an emitter.

**Table 138:** EmitterReport Operations

| Service Requests (Inputs)      | Service Responses (Outputs)   |
|--------------------------------|-------------------------------|
| <a href="#">queryEmitter</a> ⊕ | <a href="#">reportEmitter</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

##### 6.1.41.1 reportEmitter

**Description:** This operation is used to report the current status of the Emitter service.

**Namespace:** UMAA::SO::EmitterReport

**Topic:** EmitterReport

**Data Type:** EmitterReportType

**Table 139:** EmitterReportType Message Definition

| Attribute Name                                                  | Attribute Type                                  | Attribute Description                                 |
|-----------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                                 |                                                       |
| endTime†                                                        | <a href="#">DateTime</a>                        | Defines the end time for the commanded emitter level. |
| state                                                           | <a href="#">EmitterOperationalStateEnumType</a> | Defines the current emitter state.                    |
| emitterID*                                                      | <a href="#">NumericGUID</a>                     | The ID of the emitter being reported on.              |

#### 6.1.42 EmitterSpecs

The purpose of this service is to define the parameters needed for an unmanned vehicle to provide the specifications of an emitter.

**Table 140:** EmitterSpecs Operations

| Service Requests (Inputs)           | Service Responses (Outputs)        |
|-------------------------------------|------------------------------------|
| <a href="#">queryEmitterSpecs</a> ⊕ | <a href="#">reportEmitterSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.42.1 reportEmitterSpecs

**Description:** This operation is used to report the current status of the EmitterSpecs service.

**Namespace:** UMAA::SO::EmitterSpecs

**Topic:** EmitterSpecsReport

**Data Type:** EmitterSpecsReportType

**Table 141:** EmitterSpecsReportType Message Definition

| Attribute Name                                                  | Attribute Type                                  | Attribute Description                            |
|-----------------------------------------------------------------|-------------------------------------------------|--------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                                 |                                                  |
| frequencyBand                                                   | sequence< <a href="#">RadioFrequencyHertz</a> > | Defines the frequency bands used by the emitter. |
| name                                                            | <a href="#">StringShortDescription</a>          | The name of the emitter.                         |
| emitterID*                                                      | <a href="#">NumericGUID</a>                     | The ID of the emitter being reported on.         |

#### 6.1.43 EngineSpecs

The purpose of this service is to report the specifications of the engine on the vehicle.

**Table 142:** EngineSpecs Operations

| Service Requests (Inputs)          | Service Responses (Outputs)       |
|------------------------------------|-----------------------------------|
| <a href="#">queryEngineSpecs</a> ⊕ | <a href="#">reportEngineSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.43.1 reportEngineSpecs

**Description:** This operation is used to report the system specifications of the engines of the vehicle.

**Namespace:** UMAA::EO::EngineSpecs

**Topic:** EngineSpecsReport

**Data Type:** EngineSpecsReportType

**Table 143:** EngineSpecsReportType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                                 |
|-------------------------------------------------------------------|----------------------------------------|-------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                        |                                                       |
| engineKind                                                        | <a href="#">EngineKindEnumType</a>     | The type of engine.                                   |
| glowPlugTime†                                                     | <a href="#">DurationSeconds</a>        | The glow plug preset heating time.                    |
| maxCoolantLevel                                                   | <a href="#">VolumeCubicMeter</a>       | The maximum coolant level limit.                      |
| maxCoolantPressure                                                | <a href="#">PressureKiloPascals</a>    | The maximum coolant pressure limit.                   |
| maxCoolantTemp                                                    | <a href="#">Temperature</a>            | The maximum coolant temperature limit.                |
| maxEngineTemp                                                     | <a href="#">Temperature</a>            | The maximum engine temperature limit.                 |
| maxGlowPlugTemp†                                                  | <a href="#">Temperature</a>            | The maximum glow plug temperature limit.              |
| maxManifoldAirTemp                                                | <a href="#">Temperature</a>            | The maximum engine manifold air temperature limit.    |
| maxManifoldPressure                                               | <a href="#">PressureKiloPascals</a>    | The maximum engine manifold pressure limit.           |
| maxOilPressure                                                    | <a href="#">MaxEngineOilPressure</a>   | The maximum engine oil pressure limit.                |
| maxOilTemp                                                        | <a href="#">Temperature</a>            | The maximum engine oil temperature limit.             |
| minCoolantLevel                                                   | <a href="#">VolumeCubicMeter</a>       | The minimum coolant level limit.                      |
| minOilLevel                                                       | <a href="#">VolumeCubicMeter</a>       | The minimum engine oil level limit.                   |
| name                                                              | <a href="#">StringShortDescription</a> | The name of the engine.                               |
| oilCapacity                                                       | <a href="#">VolumeCubicMeter</a>       | The oil capacity of the engine.                       |
| reverseRPMLowerLimit                                              | <a href="#">EngineSpeed</a>            | Describes the lower limit of reverse RPM.             |
| reverseRPMMaxLimit                                                | <a href="#">EngineSpeed</a>            | Describes the maximum limit of reverse RPM.           |
| reverseRPMUpperLimit                                              | <a href="#">EngineSpeed</a>            | Describes the upper limit of reverse RPM.             |
| reversible                                                        | <a href="#">boolean</a>                | The reversibility of the engine rotation.             |
| RPMLowerLimit                                                     | <a href="#">EngineSpeed</a>            | The lower RPM limit to operate the engine.            |
| RPMMaxLimit                                                       | <a href="#">EngineSpeed</a>            | The physical maximum RPM limit to operate the engine. |
| RPMUpperLimit                                                     | <a href="#">EngineSpeed</a>            | The upper RPM limit to operate the engine.            |

#### 6.1.44 ExtendedPayloadStatus

The purpose of this service is to report additional per-joint status information and allow for the specification of a manipulator, pan/tilt unit, or end effector mounted on a manipulator. This covers both [ExtendedPrimitiveManipulator](#) and [ExtendedPrimitivePanTilt](#) services.

**Table 144:** ExtendedPayloadStatus Operations

| Service Requests (Inputs)                       | Service Responses (Outputs)                    |
|-------------------------------------------------|------------------------------------------------|
| <a href="#">queryHostManipulator</a> ⊕          | <a href="#">reportHostManipulator</a>          |
| <a href="#">queryJointOperationalParams</a> ⊕   | <a href="#">reportJointOperationalParams</a>   |
| <a href="#">queryPanTiltOperationalParams</a> ⊕ | <a href="#">reportPanTiltOperationalParams</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

**6.1.44.1 reportHostManipulator**

**Description:** This operation is used to report the manipulator ID and joint number on which this subsystem is mounted.

**Namespace:** UMAA::SEM::ExtendedPayloadStatus

**Topic:** HostManipulatorReport

**Data Type:** HostManipulatorReportType

**Table 145:** HostManipulatorReportType Message Definition

| Attribute Name                                                    | Attribute Type              | Attribute Description                                           |
|-------------------------------------------------------------------|-----------------------------|-----------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                             |                                                                 |
| jointID                                                           | <a href="#">NumericGUID</a> | ID of joint on which this subsystem is mounted.                 |
| manipulatorID                                                     | <a href="#">NumericGUID</a> | Subsystem ID of manipulator on which this subsystem is mounted. |

**6.1.44.2 reportJointOperationalParams**

**Description:** This operation is used to report the operational parameters of a manipulator joint.

**Namespace:** UMAA::SEM::ExtendedPayloadStatus

**Topic:** JointOperationalParamsReport

**Data Type:** JointOperationalParamsReportType

**Table 146:** JointOperationalParamsReportType Message Definition

| Attribute Name                                                    | Attribute Type                                                       | Attribute Description                             |
|-------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                                                      |                                                   |
| jointParameters                                                   | sequence< <a href="#">JointOperationalParamsType</a> > max size = 20 | List of joints with their operational parameters. |

**6.1.44.3 reportPanTiltOperationalParams**

**Description:** This operation is used to report the operational parameters of both pan/tilt joints at the same time.

**Namespace:** UMAA::SEM::ExtendedPayloadStatus

**Topic:** PanTiltOperationalParamsReport

**Data Type:** PanTiltOperationalParamsReportType

**Table 147:** PanTiltOperationalParamsReportType Message Definition

| Attribute Name                                                    | Attribute Type                        | Attribute Description                  |
|-------------------------------------------------------------------|---------------------------------------|----------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                       |                                        |
| panParams                                                         | <a href="#">OperationalParamsType</a> | Operational parameters for pan joint.  |
| tiltParams                                                        | <a href="#">OperationalParamsType</a> | Operational parameters for tilt joint. |

#### 6.1.45 FeatureImageStatus

The purpose of this service is to provide feature image related data to the vehicles and/or the operator for situational awareness in the operational area.

**Table 148:** FeatureImageStatus Operations

| Service Requests (Inputs)                  | Service Responses (Outputs)               |
|--------------------------------------------|-------------------------------------------|
| <a href="#">queryFeatureImage</a> ⊕        | <a href="#">reportFeatureImage</a>        |
| <a href="#">queryFeatureImageRemoved</a> ⊕ | <a href="#">reportFeatureImageRemoved</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

##### 6.1.45.1 reportFeatureImage

**Description:** This operation is a response that retrieves the current feature image.

**Namespace:** [UMAA::SA::FeatureImageStatus](#)

**Topic:** [FeatureImageReport](#)

**Data Type:** [FeatureImageReportType](#)

**Table 149:** FeatureImageReportType Message Definition

| Attribute Name                                                    | Attribute Type                  | Attribute Description                  |
|-------------------------------------------------------------------|---------------------------------|----------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                 |                                        |
| boundingBox†                                                      | <a href="#">BoundingBoxType</a> | The bounding box of the feature image. |
| featureID*                                                        | <a href="#">NumericGUID</a>     | An identifier of the feature.          |
| imageID*                                                          | <a href="#">NumericGUID</a>     | An identifier of the image.            |

##### 6.1.45.2 reportFeatureImageRemoved

**Description:** This operation is a response to handle notification of feature image data disposal.

**Namespace:** [UMAA::SA::FeatureImageStatus](#)

**Topic:** [FeatureImageRemovedReport](#)

**Data Type:** FeatureImageRemovedReportType

**Table 150:** FeatureImageRemovedReportType Message Definition

| Attribute Name                                                    | Attribute Type                       | Attribute Description                            |
|-------------------------------------------------------------------|--------------------------------------|--------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                      |                                                  |
| featureImagePair                                                  | <a href="#">FeatureImagePairType</a> | A pair consisting of a featureID and an imageID. |

#### 6.1.46 FinControl

The purpose of this service is to provide the control of the deflection of an individual fin for stabilization and mobility of the vehicle.

**Table 151:** FinControl Operations

| Service Requests (Inputs)            | Service Responses (Outputs)                    |
|--------------------------------------|------------------------------------------------|
| <a href="#">setFin</a>               | <a href="#">reportFinCommandStatus</a>         |
| <a href="#">queryFinCommandAck</a> ⊕ | <a href="#">reportFinCommandAck</a>            |
| <a href="#">cancelFinCommand</a> ⊕   | <a href="#">reportFinCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

##### 6.1.46.1 reportFinCommandAck

**Description:** This operation is used to report the commanded fin deflection of an individual fin of the vehicle.

**Namespace:** UMAA::EO::FinControl

**Topic:** FinCommandAckReport

**Data Type:** FinCommandAckReportType

**Table 152:** FinCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                 | Attribute Description |
|-----------------------------------------------------------------------------|--------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                |                       |
| command                                                                     | <a href="#">FinCommandType</a> | The source command.   |

##### 6.1.46.2 reportFinCommandStatus

**Description:** This operation is used to report the status of the fin deflection command.

**Namespace:** UMAA::EO::FinControl

**Topic:** FinCommandStatus

**Data Type:** FinCommandStatusType

**Table 153:** FinCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.46.3 setFin

**Description:** This operation is used to control the fin deflection of an individual fin of the vehicle.

**Namespace:** UMAA::EO::FinControl

**Topic:** FinCommand

**Data Type:** FinCommandType

**Table 154:** FinCommandType Message Definition

| Attribute Name                                                    | Attribute Type            | Attribute Description                                                                          |
|-------------------------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                           |                                                                                                |
| deflection                                                        | <a href="#">Angle</a>     | The desired fin deflection.                                                                    |
| deflectionRate†                                                   | <a href="#">AngleRate</a> | The desired fin deflection rate. If not defined the nominal rate of the hardware will be used. |

### 6.1.47 FinSpecs

The purpose of this service is to provide the specifications of an individual fin.

**Table 155:** FinSpecs Operations

| Service Requests (Inputs)       | Service Responses (Outputs)    |
|---------------------------------|--------------------------------|
| <a href="#">queryFinSpecs</a> ⊕ | <a href="#">reportFinSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.47.1 reportFinSpecs

**Description:** This operation is used to report the specifications of an individual fin.

**Namespace:** UMAA::EO::FinSpecs

**Topic:** FinSpecsReport

**Data Type:** FinSpecsReportType

**Table 156:** FinSpecsReportType Message Definition

| Attribute Name                                                    | Attribute Type                            | Attribute Description                                                              |
|-------------------------------------------------------------------|-------------------------------------------|------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                           |                                                                                    |
| maxDeflectionRate                                                 | <a href="#">AngleRate</a>                 | The maximum rate of fin deflection.                                                |
| maxNegativeDeflection                                             | <a href="#">Angle</a>                     | The maximum amount of fin deflection in the negative direction.                    |
| maxPositiveDeflection                                             | <a href="#">Angle</a>                     | The maximum amount of fin deflection in the positive direction.                    |
| minDeflectionRate                                                 | <a href="#">AngleRate</a>                 | The minimum rate of fin deflection.                                                |
| name                                                              | <a href="#">StringShortDescription</a>    | The name of the fin.                                                               |
| orientation                                                       | <a href="#">Orientation3DPlatformType</a> | The orientation of the fin away from the attachment point defined by position.     |
| position                                                          | <a href="#">Position3DBodyXYZ</a>         | The position of the base of the fin with respect to the vehicle coordinate system. |

#### 6.1.48 FinStatus

The purpose of this service is to provide the current deflection of an individual fin.

**Table 157:** FinStatus Operations

| Service Requests (Inputs)  | Service Responses (Outputs) |
|----------------------------|-----------------------------|
| <a href="#">queryFin</a> ⊕ | <a href="#">reportFin</a>   |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

##### 6.1.48.1 reportFin

**Description:** This operation is used to report the current deflection of an individual fin.

**Namespace:** UMAA::EO::FinStatus

**Topic:** FinReport

**Data Type:** FinReportType

**Table 158:** FinReportType Message Definition

| Attribute Name                                                  | Attribute Type            | Attribute Description                                       |
|-----------------------------------------------------------------|---------------------------|-------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                           |                                                             |
| deflection                                                      | <a href="#">Angle</a>     | The status of deflection direction of the fin on a vehicle. |
| deflectionRate                                                  | <a href="#">AngleRate</a> | The status of deflection rate of a fin on a vehicle.        |

#### 6.1.49 GPSFixControl

The purpose of this service is to command a vehicle to the surface to update its GPS position.

**Table 159:** GPSFixControl Operations

| Service Requests (Inputs)               | Service Responses (Outputs)                       |
|-----------------------------------------|---------------------------------------------------|
| <a href="#">setGPSFix</a>               | <a href="#">reportGPSFixCommandStatus</a>         |
| <a href="#">queryGPSFixCommandAck</a> ⊕ | <a href="#">reportGPSFixCommandAck</a>            |
| <a href="#">cancelGPSFixCommand</a> ⊕   | <a href="#">reportGPSFixCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

##### 6.1.49.1 reportGPSFixCommandAck

**Description:** This operation is used to provide the GPSFix commanded values.

**Namespace:** UMAA::MO::GPSFixControl

**Topic:** GPSFixCommandAckReport

**Data Type:** GPSFixCommandAckReportType

**Table 160:** GPSFixCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                    | Attribute Description |
|-----------------------------------------------------------------------------|-----------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                   |                       |
| command                                                                     | <a href="#">GPSFixCommandType</a> | The source command.   |

##### 6.1.49.2 reportGPSFixCommandStatus

**Description:** This operation is used to report status of the GPS Fix command.

**Namespace:** UMAA::MO::GPSFixControl

**Topic:** GPSFixCommandStatus

**Data Type:** GPSFixCommandStatusType

**Table 161:** GPSFixCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.49.3 setGPSFix**

**Description:** This operation is used to command the vehicle to surface to update its GPS position.

**Namespace:** UMAA::MO::GPSFixControl

**Topic:** GPSFixCommand

**Data Type:** GPSFixCommandType

**Table 162:** GPSFixCommandType Message Definition

| Attribute Name                                                    | Attribute Type | Attribute Description |
|-------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                |                       |

**6.1.50 GPSFixStatus**

The purpose of this service is to provide Global Positioning System (GPS) signal status.

**Table 163:** GPSFixStatus Operations

| Service Requests (Inputs)           | Service Responses (Outputs)        |
|-------------------------------------|------------------------------------|
| <a href="#">queryGPSFix</a> ⊕       | <a href="#">reportGPSFix</a>       |
| <a href="#">queryGPSFixStatus</a> ⊕ | <a href="#">reportGPSFixStatus</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

**6.1.50.1 reportGPSFix**

**Description:** This operation is used to report the current GPS signal status from the vehicle.

**Namespace:** UMAA::MO::GPSFixStatus

**Topic:** GPSFixReport

**Data Type:** GPSFixReportType

**Table 164:** GPSFixReportType Message Definition

| Attribute Name                                                  | Attribute Type                        | Attribute Description                                                  |
|-----------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                       |                                                                        |
| altitude                                                        | <a href="#">GeodeticAltitude</a>      | The current altitude in mean sea level.                                |
| course                                                          | <a href="#">CourseTrueNorth</a>       | The current direction of the platform's motion relative to true north. |
| magneticVariation                                               | <a href="#">MagneticVariation</a>     | The current magnetic variation.                                        |
| position                                                        | <a href="#">GeoPosition2DTime</a>     | The location and UTC Epoch time of the last position update.           |
| positionValid                                                   | <a href="#">boolean</a>               | Whether GPS position is valid, if not INS position is used.            |
| speedOverGround                                                 | <a href="#">GroundSpeed</a>           | The speed from the GPS.                                                |
| status                                                          | <a href="#">GPSFixEnumType</a>        | The command status of GPS Fix.                                         |
| velocity                                                        | <a href="#">Velocity3DPlatformNED</a> | The current velocity relative to the NED coordinate system.            |

**6.1.50.2 reportGPSFixStatus**

**Description:** This operation is used to report the current GPS data from vehicle.

**Namespace:** [UMAA::MO::GPSFixStatus](#)

**Topic:** [GPSFixStatusReport](#)

**Data Type:** [GPSFixStatusReportType](#)

**Table 165:** GPSFixStatusReportType Message Definition

| Attribute Name                                                  | Attribute Type                                               | Attribute Description                                     |
|-----------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                                              |                                                           |
| carrierToNoise                                                  | <a href="#">sequence&lt;SizeNumeral&gt;</a><br>max size = 11 | The current carrier to noise level.                       |
| countDown                                                       | <a href="#">Count</a>                                        | The current countdown.                                    |
| fixValid                                                        | <a href="#">boolean</a>                                      | Defines whether or not the current GPS fix is valid.      |
| lowBackupBattery                                                | <a href="#">boolean</a>                                      | Defines whether or not the backup battery is low.         |
| navSolution                                                     | <a href="#">GPSNavigationSolutionEnumType</a>                | The current GPS selected for navigation.                  |
| originPosition                                                  | <a href="#">GeoPosition3DWGS84</a>                           | The origin position.                                      |
| pCode                                                           | <a href="#">boolean</a>                                      | Defines whether or not the current Precise code is valid. |
| timeOut                                                         | <a href="#">boolean</a>                                      | Defines whether or not the time-out is valid.             |

**6.1.51 GlobalPoseConfig**

The purpose of this service is to command the current position and orientation of the vehicle in the global coordinate system. The service exposes interfaces to set the position and orientation for those vehicles requiring external pose updates. It is designated to provide an initial position for dead-reckoning.

**Table 166:** GlobalPoseConfig Operations

| Service Requests (Inputs)         | Service Responses (Outputs)                        |
|-----------------------------------|----------------------------------------------------|
| setGlobalPoseConfig               | reportGlobalPoseConfigCommandStatus                |
| cancelGlobalPoseConfig $\oplus$   | reportGlobalPoseCancelConfigCommandStatus $\oplus$ |
| queryGlobalPoseConfig $\oplus$    | reportGlobalPoseConfig                             |
| queryGlobalPoseConfigAck $\oplus$ | reportGlobalPoseConfigAck                          |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.51.1 reportGlobalPoseConfig

**Description:** This operation is used to report the current configuration command.

**Namespace:** UMAA::SA::GlobalPoseConfig

**Topic:** GlobalPoseConfigReport

**Data Type:** GlobalPoseConfigReportType

**Table 167:** GlobalPoseConfigReportType Message Definition

| Attribute Name                                                  | Attribute Type | Attribute Description |
|-----------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                |                       |

#### 6.1.51.2 reportGlobalPoseConfigAck

**Description:** This operation is used to report the current GlobalPose configuration.

**Namespace:** UMAA::SA::GlobalPoseConfig

**Topic:** GlobalPoseConfigAckReport

**Data Type:** GlobalPoseConfigAckReportType

**Table 168:** GlobalPoseConfigAckReportType Message Definition

| Attribute Name                                                  | Attribute Type                              | Attribute Description     |
|-----------------------------------------------------------------|---------------------------------------------|---------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                             |                           |
| config                                                          | <a href="#">GlobalPoseConfigCommandType</a> | The source configuration. |

### 6.1.51.3 reportGlobalPoseConfigCommandStatus

**Description:** This operation is used to report the status of the current configuration command.

**Namespace:** UMAA::SA::GlobalPoseConfig

**Topic:** GlobalPoseConfigCommandStatus

**Data Type:** GlobalPoseConfigCommandStatusType

**Table 169:** GlobalPoseConfigCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.51.4 setGlobalPoseConfig

**Description:** This operation is used to set the configuration of the vehicle's global pose.

**Namespace:** UMAA::SA::GlobalPoseConfig

**Topic:** GlobalPoseConfigCommand

**Data Type:** GlobalPoseConfigCommandType

**Table 170:** GlobalPoseConfigCommandType Message Definition

| Attribute Name                                                    | Attribute Type                              | Attribute Description                                                        |
|-------------------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                             |                                                                              |
| attitude                                                          | <a href="#">Orientation3DNEDRequirement</a> | The desired orientation (roll, pitch, yaw) of the vehicle.                   |
| attitudeCovariance†                                               | <a href="#">CovarOrientationType</a>        | The desired covariance value of the validity of the orientation data.        |
| elevation                                                         | <a href="#">ElevationType</a>               | Specifies the elevation of the vector.                                       |
| position                                                          | <a href="#">GeoPosition2D</a>               | The commanded initial position of the vehicle.                               |
| positionCovariance†                                               | <a href="#">CovariancePositionNEDType</a>   | The commanded initial covariance value of the validity of the position data. |

### 6.1.52 GongControl

The purpose of this service is to provide the operations and interfaces to control and monitor the vehicle's gong.

**Table 171:** GongControl Operations

| Service Requests (Inputs)    | Service Responses (Outputs)            |
|------------------------------|----------------------------------------|
| setGong                      | reportGongCommandStatus                |
| queryGongCommandAck $\oplus$ | reportGongCommandAck                   |
| cancelGongCommand $\oplus$   | reportGongCancelCommandStatus $\oplus$ |
| queryGong $\oplus$           | reportGong                             |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.52.1 reportGong

**Description:** This operation is used to report the current state of the gong sounding device on the vehicle.

**Namespace:** UMAA::EO::GongControl

**Topic:** GongReport

**Data Type:** GongReportType

**Table 172:** GongReportType Message Definition

| Attribute Name                                                  | Attribute Type                         | Attribute Description                                                                      |
|-----------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                        |                                                                                            |
| blastCondition†                                                 | <a href="#">BlastConditionEnumType</a> | The blast state of the annunciator.                                                        |
| blastNumber†                                                    | <a href="#">PositiveCount</a>          | The number of times blasted within the current set; includes current blast if in progress. |
| status                                                          | <a href="#">OnOffStatusEnumType</a>    | The current on/off status of the gong switch.                                              |

#### 6.1.52.2 reportGongCommandAck

**Description:** This operation is used to retrieve the current gong sounding device command on the vehicle.

**Namespace:** UMAA::EO::GongControl

**Topic:** GongCommandAckReport

**Data Type:** GongCommandAckReportType

**Table 173:** GongCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                  | Attribute Description |
|-----------------------------------------------------------------------------|---------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                 |                       |
| command                                                                     | <a href="#">GongCommandType</a> | The source command.   |

### 6.1.52.3 reportGongCommandStatus

**Description:** This operation is used to retrieve the current status of the gong sounding device on the vehicle.

**Namespace:** UMAA::EO::GongControl

**Topic:** GongCommandStatus

**Data Type:** GongCommandStatusType

**Table 174:** GongCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.52.4 setGong

**Description:** This operation is used to control the gong sounding device on the vehicle. If the command attributes do not specify a determinate end of execution, the consumer must perform a "cancel" of the command to initiate the end of command execution.

**Namespace:** UMAA::EO::GongControl

**Topic:** GongCommand

**Data Type:** GongCommandType

**Table 175:** GongCommandType Message Definition

| Attribute Name                                                    | Attribute Type                      | Attribute Description                                                           |
|-------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                     |                                                                                 |
| blasting†                                                         | <a href="#">BlastPropertiesType</a> | Blast properties. If the attribute is not provided, it means turn off the gong. |

### 6.1.53 GuardedTeleopConfig

The purpose of this service is to provide a mechanism for retrieving the guarded teleoperation configuration of a vehicle. Guarded teleoperation is normal teleoperation enhanced by obstacle detection and avoidance sensors where the commanded motion is altered based on the guarded teleoperation policy.

**Table 176:** GuardedTeleopConfig Operations

| Service Requests (Inputs)                  | Service Responses (Outputs)               |
|--------------------------------------------|-------------------------------------------|
| <a href="#">queryGuardedTeleopConfig</a> ⊕ | <a href="#">reportGuardedTeleopConfig</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

### 6.1.53.1 reportGuardedTeleopConfig

**Description:** This operation is used to report the guarded teleop configuration.

**Namespace:** UMAA::MO::GuardedTeleopConfig

**Topic:** GuardedTeleopConfigReport

**Data Type:** GuardedTeleopConfigReportType

**Table 177:** GuardedTeleopConfigReportType Message Definition

| Attribute Name                                                  | Attribute Type                            | Attribute Description                                                                        |
|-----------------------------------------------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                           |                                                                                              |
| obstacleAvoidance                                               | <a href="#">ObstacleAvoidanceEnumType</a> | Obstacle avoidance behavior.                                                                 |
| pathTolerance                                                   | <a href="#">Distance</a>                  | Maximum allowed deviation for obstacle avoidance. A value of 0 indicates infinite tolerance. |
| stopOnPitchoverLimit                                            | <a href="#">boolean</a>                   | Automatic stop when pitchover limit is reached.                                              |
| stopOnRolloverLimit                                             | <a href="#">boolean</a>                   | Automatic stop when rollover limit is reached.                                               |

### 6.1.54 GuardedTeleopControl

The purpose of this service is to provide a mechanism for setting the guarded teleoperation behavior of a vehicle. Guarded teleoperation is normal teleoperation enhanced by obstacle detection and avoidance sensors where the commanded motion is altered based on the guarded teleoperation policy.

**Table 178:** GuardedTeleopControl Operations

| Service Requests (Inputs)                             | Service Responses (Outputs)                                     |
|-------------------------------------------------------|-----------------------------------------------------------------|
| <a href="#">setGuardedTeleop</a>                      | <a href="#">reportGuardedTeleopCommandStatus</a>                |
| <a href="#">queryGuardedTeleopCommandAck</a> $\oplus$ | <a href="#">reportGuardedTeleopCommandAck</a>                   |
| <a href="#">cancelGuardedTeleopCommand</a> $\oplus$   | <a href="#">reportGuardedTeleopCancelCommandStatus</a> $\oplus$ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

### 6.1.54.1 reportGuardedTeleopCommandAck

**Description:** This operation is used to provide the GuardedTeleop commanded values.

**Namespace:** UMAA::MO::GuardedTeleopControl

**Topic:** GuardedTeleopCommandAckReport

**Data Type:** GuardedTeleopCommandAckReportType

**Table 179:** GuardedTeleopCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                           | Attribute Description |
|-----------------------------------------------------------------------------|------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                          |                       |
| command                                                                     | <a href="#">GuardedTeleopCommandType</a> | The source command.   |

**6.1.54.2 reportGuardedTeleopCommandStatus**

**Description:** This operation is used to report status of the guarded teleop policy command.

**Namespace:** UMAA::MO::GuardedTeleopControl

**Topic:** GuardedTeleopCommandStatus

**Data Type:** GuardedTeleopCommandStatusType

**Table 180:** GuardedTeleopCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.54.3 setGuardedTeleop**

**Description:** This operation is used to set the guarded teleop policy configuration.

**Namespace:** UMAA::MO::GuardedTeleopControl

**Topic:** GuardedTeleopCommand

**Data Type:** GuardedTeleopCommandType

**Table 181:** GuardedTeleopCommandType Message Definition

| Attribute Name                                                    | Attribute Type                            | Attribute Description                                                                        |
|-------------------------------------------------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                           |                                                                                              |
| obstacleAvoidance                                                 | <a href="#">ObstacleAvoidanceEnumType</a> | Obstacle avoidance behavior.                                                                 |
| pathTolerance                                                     | <a href="#">Distance</a>                  | Maximum allowed deviation for obstacle avoidance. A value of 0 indicates infinite tolerance. |
| stopOnPitchoverLimit                                              | <a href="#">boolean</a>                   | Automatic stop when pitchover limit is reached.                                              |
| stopOnRolloverLimit                                               | <a href="#">boolean</a>                   | Automatic stop when rollover limit is reached.                                               |

### 6.1.55 GuardedTeleopSpecs

The purpose of this service is to provide a mechanism for retrieving the guarded teleoperation specifications of a vehicle. Guarded teleoperation is normal teleoperation enhanced by obstacle detection and avoidance sensors where the commanded motion is altered based on the guarded teleoperation policy.

**Table 182:** GuardedTeleopSpecs Operations

| Service Requests (Inputs)                 | Service Responses (Outputs)              |
|-------------------------------------------|------------------------------------------|
| <a href="#">queryGuardedTeleopSpecs</a> ⊕ | <a href="#">reportGuardedTeleopSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.55.1 reportGuardedTeleopSpecs

**Description:** This operation is used to report the guarded teleop capabilities.

**Namespace:** UMAA::MO::GuardedTeleopSpecs

**Topic:** GuardedTeleopSpecsReport

**Data Type:** GuardedTeleopSpecsReportType

**Table 183:** GuardedTeleopSpecsReportType Message Definition

| Attribute Name                                                    | Attribute Type          | Attribute Description                                    |
|-------------------------------------------------------------------|-------------------------|----------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                         |                                                          |
| supportedAvoidObstacle                                            | <a href="#">boolean</a> | Supports deviating from path to avoid obstacle.          |
| supportedPitchoverLimit                                           | <a href="#">boolean</a> | Supports stopping when pitchover limit has been reached. |
| supportedRolloverLimit                                            | <a href="#">boolean</a> | Supports stopping when rollover limit has been reached.  |
| supportedStopOnObstacle                                           | <a href="#">boolean</a> | Supports stopping when an obstacle is blocking path.     |

### 6.1.56 GuardedTeleopStatus

The purpose of this service is to provide a mechanism for retrieving the guarded teleoperation behavior of a vehicle. Guarded teleoperation is normal teleoperation enhanced by obstacle detection and avoidance sensors where the commanded motion is altered based on the guarded teleoperation policy.

**Table 184:** GuardedTeleopStatus Operations

| Service Requests (Inputs)            | Service Responses (Outputs)         |
|--------------------------------------|-------------------------------------|
| <a href="#">queryGuardedTeleop</a> ⊕ | <a href="#">reportGuardedTeleop</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

**6.1.56.1 reportGuardedTeleop**

**Description:** This operation is used to report the guarded teleop status.

**Namespace:** UMAA::MO::GuardedTeleopStatus

**Topic:** GuardedTeleopReport

**Data Type:** GuardedTeleopReportType

**Table 185:** GuardedTeleopReportType Message Definition

| Attribute Name                                                  | Attribute Type                                                         | Attribute Description          |
|-----------------------------------------------------------------|------------------------------------------------------------------------|--------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                                                        |                                |
| status                                                          | <a href="#">GuardedTeleoperationStatus</a><br><a href="#">EnumType</a> | Current guarded teleop status. |

**6.1.57 H264VideoEncodingConfig**

The purpose of this service is to provide a mechanism for querying the configuration of the H264 encoding of the video sensors.

**Table 186:** H264VideoEncodingConfig Operations

| Service Requests (Inputs)                      | Service Responses (Outputs)                   |
|------------------------------------------------|-----------------------------------------------|
| <a href="#">queryH264VideoEncodingConfig</a> ⊕ | <a href="#">reportH264VideoEncodingConfig</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

**6.1.57.1 reportH264VideoEncodingConfig**

**Description:** This operation is used to report the H264 configuration of a video sensor.

**Namespace:** UMAA::SEM::H264VideoEncodingConfig

**Topic:** H264VideoEncodingConfigReport

**Data Type:** H264VideoEncodingConfigReportType

**Table 187:** H264VideoEncodingConfigReportType Message Definition

| Attribute Name                                                  | Attribute Type                     | Attribute Description                                                            |
|-----------------------------------------------------------------|------------------------------------|----------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                    |                                                                                  |
| gradualDecoderRefresh                                           | <a href="#">boolean</a>            | The on/off value of Gradual Decoder Refresh, also called Periodic Intra Refresh. |
| groupOfPictures                                                 | <a href="#">Count</a>              | Number of interim frames before sending a key frame.                             |
| preset                                                          | <a href="#">H264PresetEnumType</a> | Preconfigured settings for hardware specific H264 settings.                      |

| Attribute Name   | Attribute Type                                       | Attribute Description                                                      |
|------------------|------------------------------------------------------|----------------------------------------------------------------------------|
| profile          | <a href="#">H264EncodingEnumType</a>                 | H264 profile setting.                                                      |
| regionOfInterest | <a href="#">boolean</a>                              | The on/off value of region of interest (foveation) encoding, if supported. |
| ROIheight        | <a href="#">CountCapability</a>                      | Height of high bitrate window measured as a percent of total image height. |
| ROIhighBitRate   | <a href="#">CommsRateMegabitsPerSecondCapability</a> | Bitrate of ROI window, measured in Mbps.                                   |
| ROIlowBitRate    | <a href="#">CommsRateMegabitsPerSecondCapability</a> | Bitrate of remaining image, measured in Mbps.                              |
| ROIwidth         | <a href="#">CountCapability</a>                      | Width of high bitrate window measured as percent of total image width.     |
| ROIx             | <a href="#">CountCapability</a>                      | Horizontal start location of high bitrate window.                          |
| ROIy             | <a href="#">CountCapability</a>                      | Vertical start location of high bitrate window.                            |

### 6.1.58 H264VideoEncodingControl

The purpose of this service is to provide a mechanism to control H264 video encoding of one or more digital video sensors on the vehicle.

**Table 188:** H264VideoEncodingControl Operations

| Service Requests (Inputs)                          | Service Responses (Outputs)                                  |
|----------------------------------------------------|--------------------------------------------------------------|
| <a href="#">setH264VideoEncoding</a>               | <a href="#">reportH264VideoEncodingCommandStatus</a>         |
| <a href="#">queryH264VideoEncodingCommandAck</a> ⊕ | <a href="#">reportH264VideoEncodingCommandAck</a>            |
| <a href="#">cancelH264VideoEncodingCommand</a> ⊕   | <a href="#">reportH264VideoEncodingCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.58.1 reportH264VideoEncodingCommandAck

**Description:** This operation is used to report the current of the H264 encoding command.

**Namespace:** UMAA::SEM::H264VideoEncodingControl

**Topic:** H264VideoEncodingCommandAckReport

**Data Type:** H264VideoEncodingCommandAckReportType

**Table 189:** H264VideoEncodingCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                               | Attribute Description |
|-----------------------------------------------------------------------------|----------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                              |                       |
| command                                                                     | <a href="#">H264VideoEncodingCommandType</a> | The source command.   |

### 6.1.58.2 reportH264VideoEncodingCommandStatus

**Description:** This operation is used to report the status of the H264 encoding command.

**Namespace:** UMAA::SEM::H264VideoEncodingControl

**Topic:** H264VideoEncodingCommandStatus

**Data Type:** H264VideoEncodingCommandStatusType

**Table 190:** H264VideoEncodingCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.58.3 setH264VideoEncoding

**Description:** This operation is used to set the configuration of the H264 encoding of a video sensor.

**Namespace:** UMAA::SEM::H264VideoEncodingControl

**Topic:** H264VideoEncodingCommand

**Data Type:** H264VideoEncodingCommandType

**Table 191:** H264VideoEncodingCommandType Message Definition

| Attribute Name                                                    | Attribute Type                                       | Attribute Description                                                            |
|-------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                                      |                                                                                  |
| gradualDecoderRefresh                                             | <a href="#">boolean</a>                              | The on/off value of Gradual Decoder Refresh, also called Periodic Intra Refresh. |
| groupOfPictures                                                   | <a href="#">Count</a>                                | Number of interim frames before sending a key frame.                             |
| preset                                                            | <a href="#">H264PresetEnumType</a>                   | Preconfigured settings for hardware specific H264 settings.                      |
| profile                                                           | <a href="#">H264EncodingEnumType</a>                 | H264 profile setting.                                                            |
| regionOfInterest                                                  | <a href="#">boolean</a>                              | The on/off value of region of interest (foveation) encoding, if supported.       |
| ROIheight                                                         | <a href="#">H264VideoCount</a>                       | Height of high bitrate window measured as a percent of total image height.       |
| ROIhighBitRate                                                    | <a href="#">H264VideoCommsRateMega bitsPerSecond</a> | Bitrate of ROI window, measured in Mbps.                                         |
| ROIlowBitRate                                                     | <a href="#">H264VideoCommsRateMega bitsPerSecond</a> | Bitrate of remaining image, measured in Mbps.                                    |
| ROIwidth                                                          | <a href="#">H264VideoCount</a>                       | Width of high bitrate window measured as percent of total image width.           |
| ROIx                                                              | <a href="#">H264VideoCount</a>                       | Horizontal start location of high bitrate window.                                |

| Attribute Name | Attribute Type                 | Attribute Description                           |
|----------------|--------------------------------|-------------------------------------------------|
| ROIy           | <a href="#">H264VideoCount</a> | Vertical start location of high bitrate window. |

### 6.1.59 H264VideoEncodingSpecs

The purpose of this service is to provide a mechanism for querying the H264 capabilities the video sensors.

**Table 192:** H264VideoEncodingSpecs Operations

| Service Requests (Inputs)                     | Service Responses (Outputs)                  |
|-----------------------------------------------|----------------------------------------------|
| <a href="#">queryH264VideoEncodingSpecs</a> ⊕ | <a href="#">reportH264VideoEncodingSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.59.1 reportH264VideoEncodingSpecs

**Description:** This operation is used to report the H264 capabilities of a video sensor.

**Namespace:** UMAA::SEM::H264VideoEncodingSpecs

**Topic:** H264VideoEncodingSpecsReport

**Data Type:** H264VideoEncodingSpecsReportType

**Table 193:** H264VideoEncodingSpecsReportType Message Definition

| Attribute Name                                                  | Attribute Type          | Attribute Description                                             |
|-----------------------------------------------------------------|-------------------------|-------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                         |                                                                   |
| supportedBaseline                                               | <a href="#">boolean</a> | The supported/unsupported H264 profile.                           |
| supportedBestQuality                                            | <a href="#">boolean</a> | The supported/unsupported H264 preset.                            |
| supportedCAVLC444                                               | <a href="#">boolean</a> | The supported/unsupported H264 profile.                           |
| supportedConstrainedBaseline                                    | <a href="#">boolean</a> | The supported/unsupported H264 profile.                           |
| supportedConstrainedHigh                                        | <a href="#">boolean</a> | The supported/unsupported H264 profile.                           |
| supportedDriveVision                                            | <a href="#">boolean</a> | The supported/unsupported H264 preset.                            |
| supportedExtended                                               | <a href="#">boolean</a> | The supported/unsupported H264 profile.                           |
| supportedGradualDecoderRefresh                                  | <a href="#">boolean</a> | The indication of support for Gradual Decoder Refresh capability. |
| supportedGroupOfPictures                                        | <a href="#">boolean</a> | The indication of support for Group of Pictures capability.       |
| supportedHigh                                                   | <a href="#">boolean</a> | The supported/unsupported H264 profile.                           |
| supportedHigh10                                                 | <a href="#">boolean</a> | The supported/unsupported H264 profile.                           |
| supportedHigh10Intra                                            | <a href="#">boolean</a> | The supported/unsupported H264 profile.                           |
| supportedHigh422                                                | <a href="#">boolean</a> | The supported/unsupported H264 profile.                           |
| supportedHigh422Intra                                           | <a href="#">boolean</a> | The supported/unsupported H264 profile.                           |

| Attribute Name                       | Attribute Type | Attribute Description                                                    |
|--------------------------------------|----------------|--------------------------------------------------------------------------|
| supportedHigh444Intra                | boolean        | The supported/unsupported H264 profile.                                  |
| supportedHigh444Predictive           | boolean        | The supported/unsupported H264 profile.                                  |
| supportedLevel1                      | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel11                     | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel12                     | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel13                     | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel1B                     | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel2                      | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel21                     | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel22                     | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel3                      | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel31                     | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel32                     | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel4                      | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel41                     | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel42                     | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel5                      | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel51                     | boolean        | The supported/unsupported H264 level.                                    |
| supportedLevel52                     | boolean        | The supported/unsupported H264 level.                                    |
| supportedLowLatency                  | boolean        | The supported/unsupported H264 preset.                                   |
| supportedMain                        | boolean        | The supported/unsupported H264 profile.                                  |
| supportedManipulation                | boolean        | The supported/unsupported H264 preset.                                   |
| supportedMultiviewHigh               | boolean        | The supported/unsupported H264 profile.                                  |
| supportedPersistentStare             | boolean        | The supported/unsupported H264 preset.                                   |
| supportedProgramSpecific1            | boolean        | The supported/unsupported H264 preset.                                   |
| supportedProgramSpecific2            | boolean        | The supported/unsupported H264 preset.                                   |
| supportedProgramSpecific3            | boolean        | The supported/unsupported H264 preset.                                   |
| supportedProgramSpecific4            | boolean        | The supported/unsupported H264 preset.                                   |
| supportedProgressiveHigh             | boolean        | The supported/unsupported H264 profile.                                  |
| supportedRegionOfInterest            | boolean        | The indication of support for Region of Interest (foveation) capability. |
| supportedScalableBaseline            | boolean        | The supported/unsupported H264 profile.                                  |
| supportedScalableConstrainedBaseline | boolean        | The supported/unsupported H264 profile.                                  |
| supportedScalableConstrainedHigh     | boolean        | The supported/unsupported H264 profile.                                  |
| supportedScalableHigh                | boolean        | The supported/unsupported H264 profile.                                  |
| supportedScalableHighIntra           | boolean        | The supported/unsupported H264 profile.                                  |
| supportedSlowComms                   | boolean        | The supported/unsupported H264 preset.                                   |
| supportedStereoHigh                  | boolean        | The supported/unsupported H264 profile.                                  |

### 6.1.60 HealthControl

The purpose of this service is to provide the capacity to query for health details and summary.

**Table 194:** HealthControl Operations

| Service Requests (Inputs)      | Service Responses (Outputs)              |
|--------------------------------|------------------------------------------|
| setHealth                      | reportHealthCommandStatus                |
| queryHealthCommandAck $\oplus$ | reportHealthCommandAck                   |
| cancelHealthCommand $\oplus$   | reportHealthCancelCommandStatus $\oplus$ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.60.1 reportHealthCommandAck

**Description:** This operation is used to provide the Health commanded values.

**Namespace:** UMAA::SO::HealthControl

**Topic:** HealthCommandAckReport

**Data Type:** HealthCommandAckReportType

**Table 195:** HealthCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                    | Attribute Description |
|-----------------------------------------------------------------------------|-----------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                   |                       |
| command                                                                     | <a href="#">HealthCommandType</a> | The source command.   |

#### 6.1.60.2 reportHealthCommandStatus

**Description:** This operation is used to report the status of the built-in-test command.

**Namespace:** UMAA::SO::HealthControl

**Topic:** HealthCommandStatus

**Data Type:** HealthCommandStatusType

**Table 196:** HealthCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.60.3 setHealth

**Description:** This operation is used to command built-in-test for the system or subsystem.

**Namespace:** UMAA::SO::HealthControl

**Topic:** HealthCommand

**Data Type:** HealthCommandType

**Table 197:** HealthCommandType Message Definition

| Attribute Name                                                    | Attribute Type | Attribute Description |
|-------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                |                       |

### 6.1.61 HealthSummaryReport

The purpose of this service is to gather health status and fault of the systems and/or subsystems.

**Table 198:** HealthSummaryReport Operations

| Service Requests (Inputs)            | Service Responses (Outputs)         |
|--------------------------------------|-------------------------------------|
| <a href="#">queryHealthSummary</a> ⊕ | <a href="#">reportHealthSummary</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.61.1 reportHealthSummary

**Description:** This operation is used to report the system and/or subsystem health report summary.

**Namespace:** UMAA::SO::HealthSummaryReport

**Topic:** HealthSummaryReport

**Data Type:** HealthSummaryReportType

**Table 199:** HealthSummaryReportType Message Definition

| Attribute Name                                                  | Attribute Type                         | Attribute Description                                                                                                                                                                                                                 |
|-----------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                        |                                                                                                                                                                                                                                       |
| severity                                                        | <a href="#">ErrorConditionEnumType</a> | The error reporting for the system or subsystem. A zero-valued severity code indicates normal operation of the system or subsystem; otherwise the severity code reported for a system or subsystem will be the highest severity code. |

| Attribute Name | Attribute Type                        | Attribute Description                                                                                                                                                                                       |
|----------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| status         | <a href="#">StringLongDescription</a> | A detailed, human-readable string which specifies the status of the system or subsystem, such as the reason for failure. Systems should not parse or use any information from this for processing purposes. |
| resourceID*    | <a href="#">NumericGUID</a>           | A unique identifier of the resources.                                                                                                                                                                       |

### 6.1.62 HeartbeatPulseStatus

The purpose of this service is to provide a means to maintain the periodic communication connection with the vehicle.

**Table 200:** HeartbeatPulseStatus Operations

| Service Requests (Inputs)             | Service Responses (Outputs)          |
|---------------------------------------|--------------------------------------|
| <a href="#">queryHeartbeatPulse</a> ⊕ | <a href="#">reportHeartbeatPulse</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.62.1 reportHeartbeatPulse

**Description:** This operation is used to report the heartbeat pulse status of the vehicle.

**Namespace:** UMAA::SO::HeartbeatPulseStatus

**Topic:** HeartbeatPulseReport

**Data Type:** HeartbeatPulseReportType

**Table 201:** HeartbeatPulseReportType Message Definition

| Attribute Name                                                  | Attribute Type        | Attribute Description                                                               |
|-----------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                       |                                                                                     |
| heartBeat                                                       | <a href="#">Count</a> | The current heartbeat pulse to report the HeartbeatPulse connection of the vehicle. |

### 6.1.63 ImageStatus

The purpose of this service is to provide image related data to the vehicles and/or the operator for situational awareness in the operational area.

**Table 202:** ImageStatus Operations

| Service Requests (Inputs)           | Service Responses (Outputs)        |
|-------------------------------------|------------------------------------|
| <a href="#">queryImage</a> ⊕        | <a href="#">reportImage</a>        |
| <a href="#">queryImageRemoved</a> ⊕ | <a href="#">reportImageRemoved</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

### 6.1.63.1 reportImage

**Description:** This operation is a response that retrieves the current image.

**Namespace:** UMAA::SA::ImageStatus

**Topic:** ImageReport

**Data Type:** ImageReportType

**Table 203:** ImageReportType Message Definition

| Attribute Name                                                  | Attribute Type                         | Attribute Description                                                                                                         |
|-----------------------------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                        |                                                                                                                               |
| cameraPosition                                                  | <a href="#">GeoPosition3DWGS84</a>     | The position of the camera, described using latitude, longitude, and elevation.                                               |
| imageName†                                                      | <a href="#">StringShortDescription</a> | A description of the image.                                                                                                   |
| imageURI                                                        | <a href="#">StringShortDescription</a> | A URI for images. At minimum, http, https, and file schemes are permitted. Other permissible schemes may include ftp or data. |
| timestamp                                                       | <a href="#">DateTime</a>               | The timestamp of the image.                                                                                                   |
| type                                                            | <a href="#">ImageFormatEnumType</a>    | The type of the image format.                                                                                                 |
| worldTransform†                                                 | <a href="#">WorldTransformType</a>     | An optional struct used to convert image pixel coordinates to real-world map coordinates.                                     |
| imageID*                                                        | <a href="#">NumericGUID</a>            | An identifier of the image.                                                                                                   |

### 6.1.63.2 reportImageRemoved

**Description:** This operation is a response to handle notification of image data disposal.

**Namespace:** UMAA::SA::ImageStatus

**Topic:** ImageRemovedReport

**Data Type:** ImageRemovedReportType

**Table 204:** ImageRemovedReportType Message Definition

| Attribute Name                                                  | Attribute Type              | Attribute Description       |
|-----------------------------------------------------------------|-----------------------------|-----------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                             |                             |
| imageID                                                         | <a href="#">NumericGUID</a> | An identifier of the image. |

### 6.1.64 LightControl

The purpose of this service is to provide the operations and interfaces to control the vehicle's lights.

**Table 205:** LightControl Operations

| Service Requests (Inputs) | Service Responses (Outputs)     |
|---------------------------|---------------------------------|
| setLight                  | reportLightCommandStatus        |
| queryLightCommandAck⊕     | reportLightCommandAck           |
| cancelLightCommand⊕       | reportLightCancelCommandStatus⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.64.1 reportLightCommandAck

**Description:** This operation is used to retrieve the current light switch command on the vehicle.

**Namespace:** UMAA::EO::LightControl

**Topic:** LightCommandAckReport

**Data Type:** LightCommandAckReportType

**Table 206:** LightCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                   | Attribute Description |
|-----------------------------------------------------------------------------|----------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                  |                       |
| command                                                                     | <a href="#">LightCommandType</a> | The source command.   |

#### 6.1.64.2 reportLightCommandStatus

**Description:** This operation is used to retrieve the status of the light switch command on the vehicle.

**Namespace:** UMAA::EO::LightControl

**Topic:** LightCommandStatus

**Data Type:** LightCommandStatusType

**Table 207:** LightCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.64.3 setLight**

**Description:** This operation is used to control the light switch on the vehicle.

**Namespace:** UMAA::EO::LightControl

**Topic:** LightCommand

**Data Type:** LightCommandType

**Table 208:** LightCommandType Message Definition

| Attribute Name                                                    | Attribute Type          | Attribute Description      |
|-------------------------------------------------------------------|-------------------------|----------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                         |                            |
| allroundLight                                                     | <a href="#">boolean</a> | State of all-around light. |
| flashingLight                                                     | <a href="#">boolean</a> | State of flashing light.   |
| mastheadLight                                                     | <a href="#">boolean</a> | State of mast light.       |
| portSideLight                                                     | <a href="#">boolean</a> | State of port light.       |
| starboardSideLight                                                | <a href="#">boolean</a> | State of starboard light.  |
| sternLight                                                        | <a href="#">boolean</a> | State of stern light.      |
| towingLight                                                       | <a href="#">boolean</a> | State of towing light.     |

**6.1.65 LightSpecs**

The purpose of this service is to provide the operations and interfaces to report the specifications the vehicle's lights.

**Table 209:** LightSpecs Operations

| Service Requests (Inputs)         | Service Responses (Outputs)      |
|-----------------------------------|----------------------------------|
| <a href="#">queryLightSpecs</a> ⊕ | <a href="#">reportLightSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

**6.1.65.1 reportLightSpecs**

**Description:** This operation is used to report the current capabilities of the lights.

**Namespace:** UMAA::EO::LightSpecs

**Topic:** LightSpecsReport

**Data Type:** LightSpecsReportType

**Table 210:** LightSpecsReportType Message Definition

| Attribute Name                                                  | Attribute Type          | Attribute Description            |
|-----------------------------------------------------------------|-------------------------|----------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                         |                                  |
| allroundLight                                                   | <a href="#">boolean</a> | All around light supported flag. |
| flashingLight                                                   | <a href="#">boolean</a> | Flashing light supported flag.   |
| mastheadLight                                                   | <a href="#">boolean</a> | Mast light supported flag.       |
| portSideLight                                                   | <a href="#">boolean</a> | Port light supported flag.       |
| starboardSideLight                                              | <a href="#">boolean</a> | Starboard light supported flag.  |
| sternLight                                                      | <a href="#">boolean</a> | Stern light supported flag.      |
| towingLight                                                     | <a href="#">boolean</a> | Towing light supported flag.     |

### 6.1.66 LightStatus

The purpose of this service is to provide the operations and interfaces to monitor the vehicle's lights.

**Table 211:** LightStatus Operations

| Service Requests (Inputs)    | Service Responses (Outputs) |
|------------------------------|-----------------------------|
| <a href="#">queryLight</a> ⊕ | <a href="#">reportLight</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.66.1 reportLight

**Description:** This operation is used to retrieve the current state of the light switch on the vehicle.

**Namespace:** [UMAA::EO::LightStatus](#)

**Topic:** LightReport

**Data Type:** LightReportType

**Table 212:** LightReportType Message Definition

| Attribute Name                                                  | Attribute Type          | Attribute Description          |
|-----------------------------------------------------------------|-------------------------|--------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                         |                                |
| allroundLight                                                   | <a href="#">boolean</a> | All-around light power status. |
| flashingLight                                                   | <a href="#">boolean</a> | Flashing light power status.   |
| mastheadLight                                                   | <a href="#">boolean</a> | Mast light power status.       |
| portSideLight                                                   | <a href="#">boolean</a> | Port light power status.       |
| starboardSideLight                                              | <a href="#">boolean</a> | Starboard light power status.  |
| sternLight                                                      | <a href="#">boolean</a> | Stern light power status.      |
| towingLight                                                     | <a href="#">boolean</a> | Towing light power status.     |

6.1.67 LocalDriftControl

The purpose of this service is to maintain a position within the local reference frame and within a defined drift radius. See figure for reference.

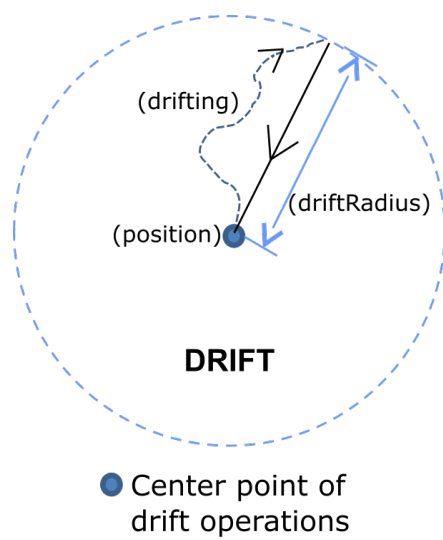


Figure 34: Example Drift Pattern

Table 213: LocalDriftControl Operations

| Service Requests (Inputs)       | Service Responses (Outputs)          |
|---------------------------------|--------------------------------------|
| setLocalDrift                   | reportLocalDriftCommandStatus        |
| queryLocalDriftCommandAck⊕      | reportLocalDriftCommandAck           |
| queryLocalDriftExecutionStatus⊕ | reportLocalDriftExecutionStatus      |
| cancelLocalDriftCommand⊕        | reportLocalDriftCancelCommandStatus⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

6.1.67.1 reportLocalDriftCommandAck

**Description:** This operation is used to report the commanded values of the position and pattern and/or time that were commanded to the vehicle in the local coordinate system (as defined within the LocalPoseStatus service).

**Namespace:** UMAA::MO::LocalDriftControl

**Topic:** LocalDriftCommandAckReport

**Data Type:** LocalDriftCommandAckReportType

**Table 214:** LocalDriftCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                        | Attribute Description |
|-----------------------------------------------------------------------------|---------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                       |                       |
| command                                                                     | <a href="#">LocalDriftCommandType</a> | The source command.   |

**6.1.67.2 reportLocalDriftCommandStatus**

**Description:** This operation is used to report the status of the local drift command.

**Namespace:** UMAA::MO::LocalDriftControl

**Topic:** LocalDriftCommandStatus

**Data Type:** LocalDriftCommandStatusType

**Table 215:** LocalDriftCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.67.3 reportLocalDriftExecutionStatus**

**Description:** This operation is used to report the current state of the vehicle drift in the local coordinate system (as defined within the LocalPoseStatus service).

**Namespace:** UMAA::MO::LocalDriftControl

**Topic:** LocalDriftExecutionStatusReport

**Data Type:** LocalDriftExecutionStatusReportType

**Table 216:** LocalDriftExecutionStatusReportType Message Definition

| Attribute Name                                                              | Attribute Type                      | Attribute Description                                                                                                   |
|-----------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                     |                                                                                                                         |
| distanceFromReference                                                       | <a href="#">Distance</a>            | Defines the distance from the reference position.                                                                       |
| localDriftState                                                             | <a href="#">LocalDriftStateType</a> | Defines the state of the local drift.                                                                                   |
| timeDriftAchieved                                                           | <a href="#">DateTime</a>            | Defines the absolute time at which the local drift is estimated to be achieved or was actually first achieved.          |
| timeDriftCompleted†                                                         | <a href="#">DateTime</a>            | Defines the absolute time at which the local drift is estimated to be completed (optional in case duration is forever). |

#### 6.1.67.4 setLocalDrift

**Description:** This operation is used to set the desired position in the local coordinate system (as defined within the LocalPoseStatus service) given the specified drift pattern and/or time. If the command attributes do not specify a determinate end of execution, the consumer must perform a "cancel" of the command to initiate the end of command execution.

**Namespace:** UMAA::MO::LocalDriftControl

**Topic:** LocalDriftCommand

**Data Type:** LocalDriftCommandType

**Table 217:** LocalDriftCommandType Message Definition

| Attribute Name                                                    | Attribute Type                                | Attribute Description                                                                                                                                   |
|-------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                               |                                                                                                                                                         |
| driftTolerance                                                    | <a href="#">Distance</a>                      | Defines the drift radius that specifies the maximum distance from the reference position the vehicle is allowed to drift.                               |
| elevation                                                         | <a href="#">ElevationType</a>                 | Defines the elevation to maintain when within the drift-Tolerance of the drift position.                                                                |
| endTime†                                                          | <a href="#">DateTimeRequirement</a>           | Specifies the end of the command execution time period for the drift operation; if not specified runs indefinitely until command is changed externally. |
| position                                                          | <a href="#">Position2DLocalNEDRequirement</a> | The desired drift circle center location in the local coordinate system (as defined within the LocalPoseStatus service).                                |
| speed                                                             | <a href="#">SpeedControlType</a>              | The desired speed to return to the drift position when the drift tolerance is exceeded.                                                                 |
| transitElevation                                                  | <a href="#">ElevationType</a>                 | The elevation used when driving back to get within the driftTolerance of the drift position.                                                            |
| transitSpeed                                                      | <a href="#">SpeedControlType</a>              | The speed at which one drives to get within the driftTolerance of the drift position.                                                                   |

#### 6.1.68 LocalFigure8Control

Intended to command the vehicle about a desired position in the local coordinate frame using a figure 8 pattern. See figure for reference.

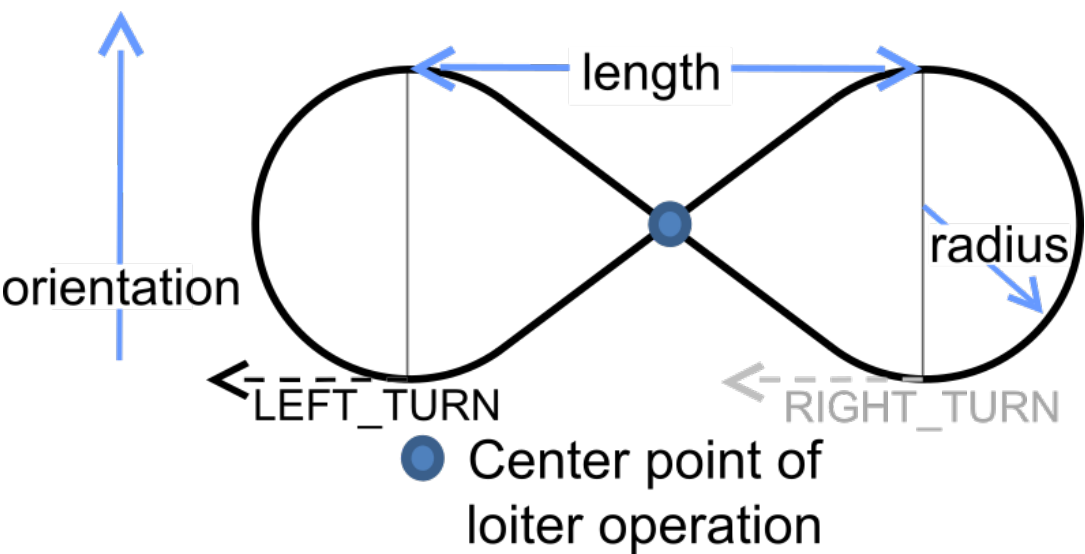


Figure 35: Example Figure 8 Pattern

Table 218: LocalFigure8Control Operations

| Service Requests (Inputs)         | Service Responses (Outputs)            |
|-----------------------------------|----------------------------------------|
| setLocalFigure8                   | reportLocalFigure8CommandStatus        |
| queryLocalFigure8CommandAck⊕      | reportLocalFigure8CommandAck           |
| queryLocalFigure8ExecutionStatus⊕ | reportLocalFigure8ExecutionStatus      |
| cancelLocalFigure8Command⊕        | reportLocalFigure8CancelCommandStatus⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

6.1.68.1 reportLocalFigure8CommandAck

**Description:** This operation is used to report the commanded values of the position and pattern and/or time that were commanded to the vehicle in the local coordinate system.

**Namespace:** UMAA::MO::LocalFigure8Control

**Topic:** LocalFigure8CommandAckReport

**Data Type:** LocalFigure8CommandAckReportType

Table 219: LocalFigure8CommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                          | Attribute Description |
|-----------------------------------------------------------------------------|-----------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                         |                       |
| command                                                                     | <a href="#">LocalFigure8CommandType</a> | The source command.   |

**6.1.68.2 reportLocalFigure8CommandStatus**

**Description:** This operation is used to report the status of the local figure 8 command.

**Namespace:** UMAA::MO::LocalFigure8Control

**Topic:** LocalFigure8CommandStatus

**Data Type:** LocalFigure8CommandStatusType

**Table 220:** LocalFigure8CommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.68.3 reportLocalFigure8ExecutionStatus**

**Description:** This operation is used to report the current position and pattern and/or time of the vehicle based in the local coordinate system.

**Namespace:** UMAA::MO::LocalFigure8Control

**Topic:** LocalFigure8ExecutionStatusReport

**Data Type:** LocalFigure8ExecutionStatusReportType

**Table 221:** LocalFigure8ExecutionStatusReportType Message Definition

| Attribute Name                                                              | Attribute Type                        | Attribute Description                                                                                       |
|-----------------------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                       |                                                                                                             |
| localFigure8State                                                           | <a href="#">LocalFigure8StateType</a> | Defines the state of the local figure 8.                                                                    |
| timePatternAchieved                                                         | <a href="#">DateTime</a>              | The absolute time at which the figure 8 pattern is estimated to be achieved or was actually first achieved. |
| timePatternCompleted†                                                       | <a href="#">DateTime</a>              | The absolute time at which the figure 8 pattern is estimated to be completed.                               |

**6.1.68.4 setLocalFigure8**

**Description:** This operation is used to set the desired position in the local coordinate system given the specified figure 8 pattern and/or time. If the command attributes do not specify a determinate end of execution, the consumer must perform a "cancel" of the command to initiate the end of command execution.

**Namespace:** UMAA::MO::LocalFigure8Control

**Topic:** LocalFigure8Command

**Data Type:** LocalFigure8CommandType

**Table 222:** LocalFigure8CommandType Message Definition

| Attribute Name                                                    | Attribute Type                                | Attribute Description                                                                                                                           |
|-------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                               |                                                                                                                                                 |
| crossTrackTolerance                                               | <a href="#">Distance</a>                      | The amount of error in position allowed from the pattern being executed.                                                                        |
| elevation                                                         | <a href="#">ElevationType</a>                 | The elevation used for the vehicle. This value is 0 for USVs.                                                                                   |
| endTime†                                                          | <a href="#">DateTimeRequirement</a>           | Specifies the end of the command execution time period for the pattern; if not specified runs indefinitely until command is changed externally. |
| length                                                            | <a href="#">Distance</a>                      | Describes the length between the semicircles at either end of the figure 8 the vehicle should stay in.                                          |
| orientation                                                       | <a href="#">DirectionRequirementType</a>      | Defines the orientation of the figure 8, measured perpendicular to the length axis.                                                             |
| position                                                          | <a href="#">Position2DLocalNEDRequirement</a> | The desired figure 8 center location in the local coordinate system.                                                                            |
| radius                                                            | <a href="#">Distance</a>                      | Describes the radius of the semicircles at either end of the figure 8 the vehicle should stay in.                                               |
| speed                                                             | <a href="#">SpeedControlType</a>              | The desired speed of the vehicle.                                                                                                               |
| transitElevation                                                  | <a href="#">ElevationType</a>                 | The elevation used while driving to the figure 8 track. Surface-based vehicles must specify this value as 0.                                    |
| transitSpeed                                                      | <a href="#">SpeedControlType</a>              | The speed at which one drives to the figure 8 track.                                                                                            |
| turnDirection                                                     | <a href="#">WaterTurnDirectionEnumType</a>    | The desired turn direction for the figure 8 pattern of the vehicle.                                                                             |

### 6.1.69 LocalHoverControl

The function of this service is to command the vehicle to hover in a desired position in the local coordinate frame.

**Table 223:** LocalHoverControl Operations

| Service Requests (Inputs)                        | Service Responses (Outputs)                           |
|--------------------------------------------------|-------------------------------------------------------|
| <a href="#">setLocalHover</a>                    | <a href="#">reportLocalHoverCommandStatus</a>         |
| <a href="#">queryLocalHoverCommandAck</a> ⊕      | <a href="#">reportLocalHoverCommandAck</a>            |
| <a href="#">queryLocalHoverExecutionStatus</a> ⊕ | <a href="#">reportLocalHoverExecutionStatus</a>       |
| <a href="#">cancelLocalHoverCommand</a> ⊕        | <a href="#">reportLocalHoverCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.69.1 reportLocalHoverCommandAck

**Description:** This operation is used to report the commanded values of the position or time that was commanded to the vehicle in the local coordinate system.

**Namespace:** UMAA::MO::LocalHoverControl

**Topic:** LocalHoverCommandAckReport

**Data Type:** LocalHoverCommandAckReportType

**Table 224:** LocalHoverCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                        | Attribute Description |
|-----------------------------------------------------------------------------|---------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                       |                       |
| command                                                                     | <a href="#">LocalHoverCommandType</a> | The source command.   |

### 6.1.69.2 reportLocalHoverCommandStatus

**Description:** This operation is used to report the status of the local hover command.

**Namespace:** UMAA::MO::LocalHoverControl

**Topic:** LocalHoverCommandStatus

**Data Type:** LocalHoverCommandStatusType

**Table 225:** LocalHoverCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.69.3 reportLocalHoverExecutionStatus

**Description:** This operation is used to report the current position or time that the vehicle was hovering based in the local coordinate system.

**Namespace:** UMAA::MO::LocalHoverControl

**Topic:** LocalHoverExecutionStatusReport

**Data Type:** LocalHoverExecutionStatusReportType

**Table 226:** LocalHoverExecutionStatusReportType Message Definition

| Attribute Name                                                              | Attribute Type                      | Attribute Description                 |
|-----------------------------------------------------------------------------|-------------------------------------|---------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                     |                                       |
| localHoverState                                                             | <a href="#">LocalHoverStateType</a> | Defines the state of the local hover. |

| Attribute Name      | Attribute Type           | Attribute Description                                                                                     |
|---------------------|--------------------------|-----------------------------------------------------------------------------------------------------------|
| timeHoverAchieved   | <a href="#">DateTime</a> | The absolute time at which hover is estimated to be achieved or was actually first achieved.              |
| timeHoverCompleted† | <a href="#">DateTime</a> | The absolute time at which the hover is estimated to be completed (optional in case duration is forever). |

#### 6.1.69.4 setLocalHover

**Description:** This operation is used to set the desired hover position in the local coordinate system given the desired location and/or time. If the command attributes do not specify a determinate end of execution, the consumer must perform a "cancel" of the command to initiate the end of command execution.

**Namespace:** UMAA::MO::LocalHoverControl

**Topic:** LocalHoverCommand

**Data Type:** LocalHoverCommandType

**Table 227:** LocalHoverCommandType Message Definition

| Attribute Name                                                    | Attribute Type                                | Attribute Description                                                                                                                         |
|-------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                               |                                                                                                                                               |
| controlPriority                                                   | <a href="#">HoverKindEnumType</a>             | The desired priority to hover at the specified point.                                                                                         |
| elevation                                                         | <a href="#">ElevationType</a>                 | The elevation used for the vehicle. This value is 0 for USVs.                                                                                 |
| endTime†                                                          | <a href="#">DateTimeRequirement</a>           | Specifies the end of the command execution time period for the hover; if not specified runs indefinitely until command is changed externally. |
| heading                                                           | <a href="#">DirectionRequirementType</a>      | Defines the heading that the vehicle must maintain for hovering.                                                                              |
| position                                                          | <a href="#">Position2DLocalNEDRequirement</a> | The desired hover location (X, Y) in the local coordinate system.                                                                             |
| transitElevation                                                  | <a href="#">ElevationType</a>                 | The elevation used while driving to the hover location. Surface-based vehicles must specify this value as 0.                                  |
| transitSpeed                                                      | <a href="#">VariableSpeedControlType</a>      | The speed at which one drives to the hover location.                                                                                          |

#### 6.1.70 LocalPoseConfig

The purpose of this service is to configure the initial position and orientation of the vehicle in the local coordinate system. The service exposes interfaces to set the position and orientation for those vehicles requiring external pose updates. It is designated to provide an initial position for dead-reckoning.

**Table 228:** LocalPoseConfig Operations

| Service Requests (Inputs)          | Service Responses (Outputs)                        |
|------------------------------------|----------------------------------------------------|
| <a href="#">setLocalPoseConfig</a> | <a href="#">reportLocalPoseConfigCommandStatus</a> |

| Service Requests (Inputs)                 | Service Responses (Outputs)                                |
|-------------------------------------------|------------------------------------------------------------|
| <a href="#">cancelLocalPoseConfig</a> ⊕   | <a href="#">reportLocalPoseCancelConfigCommandStatus</a> ⊕ |
| <a href="#">queryLocalPoseConfig</a> ⊕    | <a href="#">reportLocalPoseConfig</a>                      |
| <a href="#">queryLocalPoseConfigAck</a> ⊕ | <a href="#">reportLocalPoseConfigAck</a>                   |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.70.1 [reportLocalPoseConfig](#)

**Description:** This operation is used to report the current configuration command.

**Namespace:** `UMAA::SA::LocalPoseConfig`

**Topic:** `LocalPoseConfigReport`

**Data Type:** `LocalPoseConfigReportType`

**Table 229:** `LocalPoseConfigReportType` Message Definition

| Attribute Name                                                  | Attribute Type                              | Attribute Description                                                                             |
|-----------------------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                             |                                                                                                   |
| attitude                                                        | <a href="#">Orientation3DNEDRequirement</a> | The initial orientation (roll, pitch, yaw) of the vehicle relative to the local tangent plane.    |
| attitudeCovariance†                                             | <a href="#">CovarOrientationType</a>        | The acceptable covariance value of the validity of the orientation data.                          |
| elevation                                                       | <a href="#">ElevationType</a>               | Specifies the elevation of the vector on the down axis.                                           |
| position                                                        | <a href="#">Position2DLocalNED</a>          | The initial position of the vehicle in the local coordinate system, relative to the local origin. |
| positionCovariance†                                             | <a href="#">CovariancePositionNEDType</a>   | The acceptable covariance value of the validity of the position data.                             |

#### 6.1.70.2 [reportLocalPoseConfigAck](#)

**Description:** This operation is used to report the current LocalPose configuration.

**Namespace:** `UMAA::SA::LocalPoseConfig`

**Topic:** `LocalPoseConfigAckReport`

**Data Type:** `LocalPoseConfigAckReportType`

**Table 230:** LocalPoseConfigAckReportType Message Definition

| Attribute Name                                                    | Attribute Type                             | Attribute Description     |
|-------------------------------------------------------------------|--------------------------------------------|---------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                            |                           |
| config                                                            | <a href="#">LocalPoseConfigCommandType</a> | The source configuration. |

**6.1.70.3 reportLocalPoseConfigCommandStatus**

**Description:** This operation is used to report the status of the current configuration command.

**Namespace:** [UMAA::SA::LocalPoseConfig](#)

**Topic:** LocalPoseConfigCommandStatus

**Data Type:** LocalPoseConfigCommandStatusType

**Table 231:** LocalPoseConfigCommandStatusType Message Definition

| Attribute Name                                                           | Attribute Type | Attribute Description |
|--------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACCommandStatus</a> |                |                       |

**6.1.70.4 setLocalPoseConfig**

**Description:** This operation is used to set the configuration of the vehicle's local pose.

**Namespace:** [UMAA::SA::LocalPoseConfig](#)

**Topic:** LocalPoseConfigCommand

**Data Type:** LocalPoseConfigCommandType

**Table 232:** LocalPoseConfigCommandType Message Definition

| Attribute Name                                                     | Attribute Type                              | Attribute Description                                                                          |
|--------------------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACCommand</a> |                                             |                                                                                                |
| attitude                                                           | <a href="#">Orientation3DNEDRequirement</a> | The initial orientation (roll, pitch, yaw) of the vehicle relative to the local tangent plane. |
| attitudeCovariance†                                                | <a href="#">CovarOrientationType</a>        | The acceptable covariance value of the validity of the orientation data.                       |
| elevation                                                          | <a href="#">ElevationType</a>               | Specifies the elevation of the vector on the down axis.                                        |
| position                                                           | <a href="#">Position2DLocalNED</a>          | The commanded initial position of the vehicle.                                                 |
| positionCovariance†                                                | <a href="#">CovariancePositionNEDType</a>   | The acceptable covariance value of the validity of the position data.                          |

### 6.1.71 LocalPoseStatus

The purpose of this service is to report the current position and orientation of the vehicle in the local coordinate system. The local coordinate system uses the North-East-Down reference frame. The vehicle's initial position, relative to the local origin, is configured in the LocalPoseConfig service.

**Table 233:** LocalPoseStatus Operations

| Service Requests (Inputs)        | Service Responses (Outputs)     |
|----------------------------------|---------------------------------|
| <a href="#">queryLocalPose</a> ⊕ | <a href="#">reportLocalPose</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.71.1 reportLocalPose

**Description:** This operation is used to report the current position and orientation of the vehicle in the local coordinate system.

**Namespace:** UMAA::SA::LocalPoseStatus

**Topic:** LocalPoseReport

**Data Type:** LocalPoseReportType

**Table 234:** LocalPoseReportType Message Definition

| Attribute Name                                                  | Attribute Type                            | Attribute Description                                                                          |
|-----------------------------------------------------------------|-------------------------------------------|------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                           |                                                                                                |
| altitude†                                                       | <a href="#">GeodeticAltitude</a>          | The current altitude mean-sea-level of the vehicle.                                            |
| altitudeAGL†                                                    | <a href="#">DistanceAGL</a>               | The current altitude above-ground-level of the vehicle.                                        |
| altitudeASF†                                                    | <a href="#">DistanceASF</a>               | The current altitude above-sea-floor of the vehicle.                                           |
| attitude                                                        | <a href="#">Orientation3DNEDType</a>      | The current orientation (roll, pitch, yaw) of the vehicle relative to the local tangent plane. |
| attitudeCovariance†                                             | <a href="#">CovarOrientationType</a>      | The current error covariance value of the attitude data.                                       |
| course                                                          | <a href="#">CourseTrueNorth</a>           | The current course angle used for the vehicle.                                                 |
| depth†                                                          | <a href="#">DistanceBSL</a>               | The current depth of the maritime vehicle.                                                     |
| position                                                        | <a href="#">Position2DLocalNED</a>        | The current position of the vehicle in the local coordinate system.                            |
| positionCovariance†                                             | <a href="#">CovariancePositionNEDType</a> | The current covariance value of the validity of the position data.                             |

### 6.1.72 LocalRacetrackControl

The purpose of this service is to command the vehicle into a racetrack pattern about a desired position in the local coordinate frame. The start location on the Racetrack and the path to this start location is system dependent.

See figure for reference.

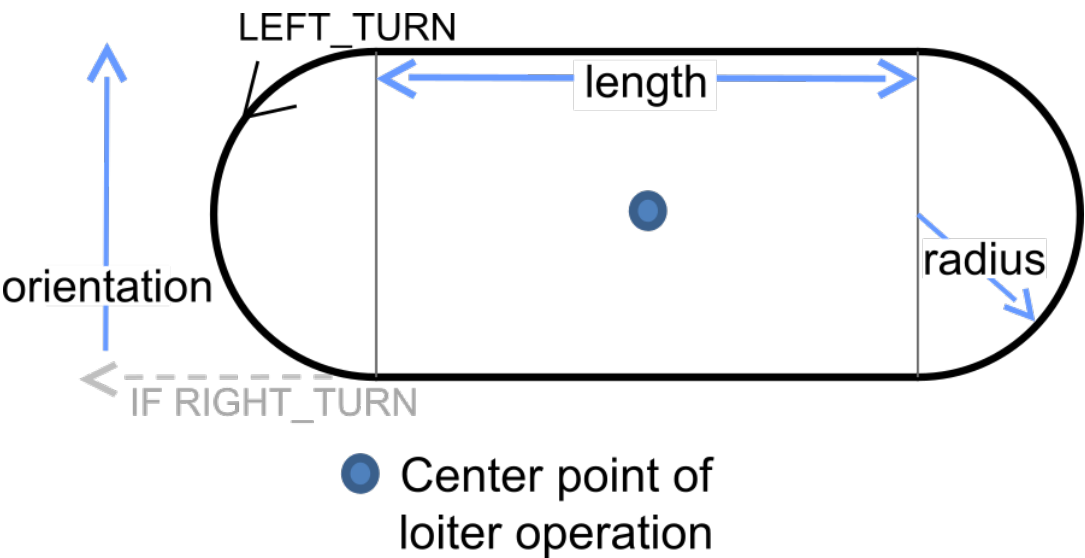


Figure 36: Example Racetrack Pattern

Table 235: LocalRacetrackControl Operations

| Service Requests (Inputs)           | Service Responses (Outputs)              |
|-------------------------------------|------------------------------------------|
| setLocalRacetrack                   | reportLocalRacetrackCommandStatus        |
| queryLocalRacetrackCommandAck⊕      | reportLocalRacetrackCommandAck           |
| queryLocalRacetrackExecutionStatus⊕ | reportLocalRacetrackExecutionStatus      |
| cancelLocalRacetrackCommand⊕        | reportLocalRacetrackCancelCommandStatus⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

6.1.72.1 reportLocalRacetrackCommandAck

**Description:** This operation is used to report the parameters of the racetrack pattern that was commanded to the vehicle in the local coordinate system.

**Namespace:** UMAA::MO::LocalRacetrackControl

**Topic:** LocalRacetrackCommandAckReport

**Data Type:** LocalRacetrackCommandAckReportType

Table 236: LocalRacetrackCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                            | Attribute Description |
|-----------------------------------------------------------------------------|-------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                           |                       |
| command                                                                     | <a href="#">LocalRacetrackCommandType</a> | The source command.   |

**6.1.72.2 reportLocalRacetrackCommandStatus**

**Description:** This operation is used to report the status of the local racetrack command.

**Namespace:** UMAA::MO::LocalRacetrackControl

**Topic:** LocalRacetrackCommandStatus

**Data Type:** LocalRacetrackCommandStatusType

**Table 237:** LocalRacetrackCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.72.3 reportLocalRacetrackExecutionStatus**

**Description:** This operation is used to report the current racetrack pattern execution status based on the local coordinate system.

**Namespace:** UMAA::MO::LocalRacetrackControl

**Topic:** LocalRacetrackExecutionStatusReport

**Data Type:** LocalRacetrackExecutionStatusReportType

**Table 238:** LocalRacetrackExecutionStatusReportType Message Definition

| Attribute Name                                                              | Attribute Type                          | Attribute Description                                                                                        |
|-----------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                         |                                                                                                              |
| localRacetrackState                                                         | <a href="#">LocalRacetrackStateType</a> | Defines the state of the local racetrack.                                                                    |
| timePatternAchieved                                                         | <a href="#">DateTime</a>                | The absolute time at which the racetrack pattern is estimated to be achieved or was actually first achieved. |
| timePatternCompleted†                                                       | <a href="#">DateTime</a>                | The absolute time at which the racetrack pattern is estimated to be completed.                               |

**6.1.72.4 setLocalRacetrack**

**Description:** This operation is used to initiate the racetrack pattern based on the specified position in the local coordinate system. If the command attributes do not specify a determinate end of execution, the consumer must perform a "cancel" of the command to initiate the end of command execution.

**Namespace:** UMAA::MO::LocalRacetrackControl

**Topic:** LocalRacetrackCommand

**Data Type:** LocalRacetrackCommandType

**Table 239:** LocalRacetrackCommandType Message Definition

| Attribute Name                                                    | Attribute Type                                | Attribute Description                                                                                                                           |
|-------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                               |                                                                                                                                                 |
| crossTrackTolerance                                               | <a href="#">Distance</a>                      | The amount of error in position allowed from the pattern being executed.                                                                        |
| elevation                                                         | <a href="#">ElevationType</a>                 | The elevation used for the vehicle. This value is 0 for USVs.                                                                                   |
| endTime†                                                          | <a href="#">DateTimeRequirement</a>           | Specifies the end of the command execution time period for the pattern; if not specified runs indefinitely until command is changed externally. |
| length                                                            | <a href="#">Distance</a>                      | Describes the length between the semicircles at either end of the racetrack the vehicle should stay in.                                         |
| orientation                                                       | <a href="#">DirectionRequirementType</a>      | Defines the orientation of the racetrack, measured perpendicular to the length axis.                                                            |
| position                                                          | <a href="#">Position2DLocalNEDRequirement</a> | The desired racetrack center location in the local coordinate system.                                                                           |
| radius                                                            | <a href="#">Distance</a>                      | Describes the radius of the semicircles at either end of the racetrack the vehicle should stay in.                                              |
| speed                                                             | <a href="#">SpeedControlType</a>              | The desired speed of the vehicle.                                                                                                               |
| transitElevation                                                  | <a href="#">ElevationType</a>                 | The elevation used while driving to the racetrack. Surface-based vehicles must specify this value as 0.                                         |
| transitSpeed                                                      | <a href="#">SpeedControlType</a>              | The speed at which one drives to the racetrack.                                                                                                 |
| turnDirection                                                     | <a href="#">WaterTurnDirectionEnumType</a>    | The desired turn direction for the racetrack pattern of the vehicle.                                                                            |

### 6.1.73 LocalRegularPolygonControl

Intended to command the vehicle about a desired position in the local coordinate frame using a regular polygon pattern circumscribed on a circle. The start location on the RegularPolygon and the path to this start location is system dependent. See figure for reference.

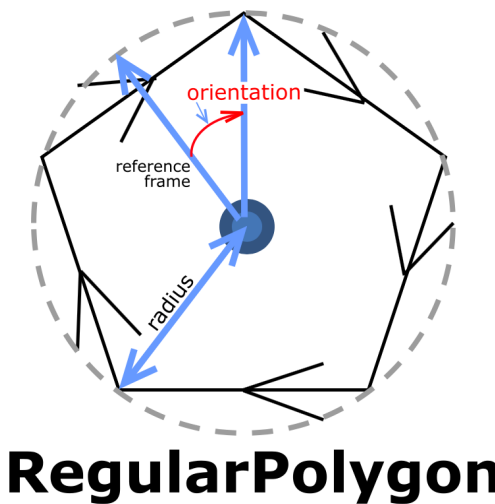


Figure 37: Example Polygon Pattern

Table 240: LocalRegularPolygonControl Operations

| Service Requests (Inputs)                | Service Responses (Outputs)                   |
|------------------------------------------|-----------------------------------------------|
| setLocalRegularPolygon                   | reportLocalRegularPolygonCommandStatus        |
| queryLocalRegularPolygonCommandAck⊕      | reportLocalRegularPolygonCommandAck           |
| queryLocalRegularPolygonExecutionStatus⊕ | reportLocalRegularPolygonExecutionStatus      |
| cancelLocalRegularPolygonCommand⊕        | reportLocalRegularPolygonCancelCommandStatus⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

6.1.73.1 reportLocalRegularPolygonCommandAck

**Description:** This operation is used to report the commanded values of the position and pattern and/or time that were commanded to the vehicle in the local coordinate system.

**Namespace:** UMAA::MO::LocalRegularPolygonControl

**Topic:** LocalRegularPolygonCommandAckReport

**Data Type:** LocalRegularPolygonCommandAckReportType

Table 241: LocalRegularPolygonCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                                  | Attribute Description |
|-----------------------------------------------------------------------------|-------------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                                 |                       |
| command                                                                     | <a href="#">LocalRegularPolygonComm andType</a> | The source command.   |

### 6.1.73.2 reportLocalRegularPolygonCommandStatus

**Description:** This operation is used to report the status of the local regular polygon command.

**Namespace:** UMAA::MO::LocalRegularPolygonControl

**Topic:** LocalRegularPolygonCommandStatus

**Data Type:** LocalRegularPolygonCommandStatusType

**Table 242:** LocalRegularPolygonCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.73.3 reportLocalRegularPolygonExecutionStatus

**Description:** This operation is used to report the current position and pattern and/or time of the vehicle based in the local coordinate system.

**Namespace:** UMAA::MO::LocalRegularPolygonControl

**Topic:** LocalRegularPolygonExecutionStatusReport

**Data Type:** LocalRegularPolygonExecutionStatusReportType

**Table 243:** LocalRegularPolygonExecutionStatusReportType Message Definition

| Attribute Name                                                              | Attribute Type                               | Attribute Description                                                                                      |
|-----------------------------------------------------------------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                              |                                                                                                            |
| localRegularPolygonState                                                    | <a href="#">LocalRegularPolygonStateType</a> | Defines the state of the local regular polygon.                                                            |
| timePatternAchieved                                                         | <a href="#">DateTime</a>                     | The absolute time at which the polygon pattern is estimated to be achieved or was actually first achieved. |
| timePatternCompleted†                                                       | <a href="#">DateTime</a>                     | The absolute time at which the polygon pattern is estimated to be completed.                               |

### 6.1.73.4 setLocalRegularPolygon

**Description:** This operation is used to set the desired position in the local coordinate system given the specified regular polygon pattern and/or time. If the command attributes do not specify a determinate end of execution, the consumer must perform a "cancel" of the command to initiate the end of command execution.

**Namespace:** UMAA::MO::LocalRegularPolygonControl

**Topic:** LocalRegularPolygonCommand

**Data Type:** LocalRegularPolygonCommandType

**Table 244:** LocalRegularPolygonCommandType Message Definition

| Attribute Name                                                     | Attribute Type                                | Attribute Description                                                                                                                           |
|--------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACCommand</a> |                                               |                                                                                                                                                 |
| crossTrackTolerance                                                | <a href="#">Distance</a>                      | The amount of error in position allowed from the pattern being executed.                                                                        |
| diameter                                                           | <a href="#">Distance</a>                      | The diameter of a circumscribed circle around the polygon.                                                                                      |
| elevation                                                          | <a href="#">ElevationType</a>                 | The elevation used for the vehicle. This value is 0 for USVs.                                                                                   |
| endTime†                                                           | <a href="#">DateTimeRequirement</a>           | Specifies the end of the command execution time period for the pattern; if not specified runs indefinitely until command is changed externally. |
| numberSides                                                        | <a href="#">SidesCount</a>                    | The number of sides on the polygon.                                                                                                             |
| orientation                                                        | <a href="#">DirectionRequirementType</a>      | Defines the orientation from the reference position of the polygon to one point on the polygon.                                                 |
| position                                                           | <a href="#">Position2DLocalNEDRequirement</a> | The desired regular polygon center location in the local coordinate system.                                                                     |
| speed                                                              | <a href="#">SpeedControlType</a>              | The desired speed of the vehicle.                                                                                                               |
| transitElevation                                                   | <a href="#">ElevationType</a>                 | The elevation used while driving to the polygon track. Surface-based vehicles must specify this value as 0.                                     |
| transitSpeed                                                       | <a href="#">SpeedControlType</a>              | The speed at which one drives to the polygon track.                                                                                             |
| turnDirection                                                      | <a href="#">WaterTurnDirectionEnumType</a>    | The desired turn direction for the polygon pattern of the vehicle.                                                                              |

#### 6.1.74 LocalVectorControl

The purpose of this service is to command the vehicle to maintain a provided speed and altitude or depth (if supported).

**Table 245:** LocalVectorControl Operations

| Service Requests (Inputs)                        | Service Responses (Outputs)                           |
|--------------------------------------------------|-------------------------------------------------------|
| <a href="#">setLocalVector</a>                   | <a href="#">reportLocalVectorCommandStatus</a>        |
| <a href="#">queryLocalVectorCommandAck⊕</a>      | <a href="#">reportLocalVectorCommandAck</a>           |
| <a href="#">queryLocalVectorExecutionStatus⊕</a> | <a href="#">reportLocalVectorExecutionStatus</a>      |
| <a href="#">cancelLocalVectorCommand⊕</a>        | <a href="#">reportLocalVectorCancelCommandStatus⊕</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

##### 6.1.74.1 reportLocalVectorCommandAck

**Description:** This operation is used to report the current commanded values of the speed and depth or altitude to a vehicle in the local coordinate system.

**Namespace:** UMAA::MO::LocalVectorControl

**Topic:** LocalVectorCommandAckReport

**Data Type:** LocalVectorCommandAckReportType

**Table 246:** LocalVectorCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                         | Attribute Description |
|-----------------------------------------------------------------------------|----------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                        |                       |
| command                                                                     | <a href="#">LocalVectorCommandType</a> | The source command.   |

#### 6.1.74.2 reportLocalVectorCommandStatus

**Description:** This operation is used to report the status of the local vector command.

**Namespace:** UMAA::MO::LocalVectorControl

**Topic:** LocalVectorCommandStatus

**Data Type:** LocalVectorCommandStatusType

**Table 247:** LocalVectorCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.74.3 reportLocalVectorExecutionStatus

**Description:** This operation is used to report the current vector data based in the local coordinate system.

**Namespace:** UMAA::MO::LocalVectorControl

**Topic:** LocalVectorExecutionStatusReport

**Data Type:** LocalVectorExecutionStatusReportType

**Table 248:** LocalVectorExecutionStatusReportType Message Definition

| Attribute Name                                                              | Attribute Type          | Attribute Description                                                                                                                                                                              |
|-----------------------------------------------------------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                         |                                                                                                                                                                                                    |
| elevationAchieved                                                           | <a href="#">boolean</a> | When the vector is executing, this indicates that the elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |

| Attribute Name | Attribute Type          | Attribute Description                                                                                                                                                                          |
|----------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| speedAchieved  | <a href="#">boolean</a> | When the vector is executing, this indicates that the speed requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |

#### 6.1.74.4 setLocalVector

**Description:** This operation is used to command the speed and altitude or depth of a vehicle in the local coordinate system. If the command attributes do not specify a determinate end of execution, the consumer must perform a "cancel" of the command to initiate the end of command execution.

**Namespace:** UMAA::MO::LocalVectorControl

**Topic:** LocalVectorCommand

**Data Type:** LocalVectorCommandType

**Table 249:** LocalVectorCommandType Message Definition

| Attribute Name                                                    | Attribute Type                           | Attribute Description                                                                                                                                                                  |
|-------------------------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                          |                                                                                                                                                                                        |
| depthChangePitch†                                                 | <a href="#">PitchYNEDRequirement</a>     | The desired angle of the vehicle when traversing to the requested elevation for UUVs.                                                                                                  |
| direction                                                         | <a href="#">DirectionRequirementType</a> | The direction the vehicle is traveling regardless of its attitude.                                                                                                                     |
| directionMode                                                     | <a href="#">DirectionModeEnumType</a>    | Specifies the vehicle direction mode.                                                                                                                                                  |
| elevation                                                         | <a href="#">ElevationType</a>            | Specifies the elevation of the vector. This value is 0 for USVs.                                                                                                                       |
| endTime†                                                          | <a href="#">DateTimeRequirement</a>      | Specifies the end of the command execution time period for the vector; if not specified runs indefinitely until command is changed externally or another terminating condition occurs. |
| speed                                                             | <a href="#">SpeedControlType</a>         | The desired speed of the vehicle.                                                                                                                                                      |

#### 6.1.75 LocalWaypointControl

The purpose of this service is to command the vehicle to traverse through a series of waypoints, each with a desired speed and the option to maintain track.

**Table 250:** LocalWaypointControl Operations

| Service Requests (Inputs)                          | Service Responses (Outputs)                             |
|----------------------------------------------------|---------------------------------------------------------|
| <a href="#">setLocalWaypoint</a>                   | <a href="#">reportLocalWaypointCommandStatus</a>        |
| <a href="#">queryLocalWaypointCommandAck⊕</a>      | <a href="#">reportLocalWaypointCommandAck</a>           |
| <a href="#">queryLocalWaypointExecutionStatus⊕</a> | <a href="#">reportLocalWaypointExecutionStatus</a>      |
| <a href="#">cancelLocalWaypointCommand⊕</a>        | <a href="#">reportLocalWaypointCancelCommandStatus⊕</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.75.1 reportLocalWaypointCommandAck

**Description:** This operation is used to report the commanded values of the waypoint data based in the local coordinate system.

**Namespace:** UMAA::MO::LocalWaypointControl

**Topic:** LocalWaypointCommandAckReport

**Data Type:** LocalWaypointCommandAckReportType

**Table 251:** LocalWaypointCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                           | Attribute Description |
|-----------------------------------------------------------------------------|------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                          |                       |
| command                                                                     | <a href="#">LocalWaypointCommandType</a> | The source command.   |

#### 6.1.75.2 reportLocalWaypointCommandStatus

**Description:** This operation is used to report the status of the local waypoint command.

**Namespace:** UMAA::MO::LocalWaypointControl

**Topic:** LocalWaypointCommandStatus

**Data Type:** LocalWaypointCommandStatusType

**Table 252:** LocalWaypointCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.75.3 reportLocalWaypointExecutionStatus

**Description:** This operation is used to report execution status details related to a commanded series of waypoint data based in the local coordinate system.

**Namespace:** UMAA::MO::LocalWaypointControl

**Topic:** LocalWaypointExecutionStatusReport

**Data Type:** LocalWaypointExecutionStatusReportType

**Table 253:** LocalWaypointExecutionStatusReportType Message Definition

| Attribute Name                                                              | Attribute Type              | Attribute Description                                                                                                                                                                                 |
|-----------------------------------------------------------------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                             |                                                                                                                                                                                                       |
| arrivalTime                                                                 | <a href="#">DateTime</a>    | The arrival time of the end of the route.                                                                                                                                                             |
| crossTrackError                                                             | <a href="#">Distance</a>    | Defines the current cross track error (only valid if crossTrackTolerance is defined).                                                                                                                 |
| cumulativeDistance                                                          | <a href="#">Distance</a>    | Defines the ground distance travel from the start of the route to this point.                                                                                                                         |
| distanceRemaining                                                           | <a href="#">Distance</a>    | Defines the amount of distance remaining from a point to the end of the route.                                                                                                                        |
| distanceToWaypoint                                                          | <a href="#">Distance</a>    | Defines the remaining distance to the current waypoint.                                                                                                                                               |
| elevationAchieved                                                           | <a href="#">boolean</a>     | When the waypoint is executing, this indicates that the elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.  |
| speedAchieved                                                               | <a href="#">boolean</a>     | When the waypoint is executing, this indicates that the speed requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.      |
| timeToWaypoint                                                              | <a href="#">DateTime</a>    | The absolute time at which the waypoint is estimated to be achieved or was actually first achieved.                                                                                                   |
| trackLineAchieved                                                           | <a href="#">boolean</a>     | When the waypoint is executing, this indicates that the track line requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |
| waypointsRemaining                                                          | <a href="#">Count</a>       | Defines the remaining number of waypoints, which includes the current waypoint.                                                                                                                       |
| waypointID*                                                                 | <a href="#">NumericGUID</a> | Defines the current waypoint ID.                                                                                                                                                                      |

#### 6.1.75.4 setLocalWaypoint

**Description:** This operation is used to report execution status details related to a commanded series of waypoint data based in the local coordinate system.

**Namespace:** UMAA::MO::LocalWaypointControl

**Topic:** LocalWaypointCommand

**Data Type:** LocalWaypointCommandType

**Table 254:** LocalWaypointCommandType Message Definition

| Attribute Name                                                    | Attribute Type | Attribute Description |
|-------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                |                       |

| Attribute Name   | Attribute Type               | Attribute Description                                                                                                                                                                                                                                                   |
|------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| waypoints→listID | LargeList<LocalWaypointType> | The desired series of waypoints in the local coordinate system. This attribute is implemented as a large list, see <a href="#">subsection 3.8</a> for an explanation. The associated topic is UMAA::MO::LocalWaypointControl::LocalWaypointCommandWaypointsListElement. |

### 6.1.76 MaintenanceReminderControl

The purpose of this service is to provide maintenance reminder details and summary.

**Table 255:** MaintenanceReminderControl Operations

| Service Requests (Inputs)           | Service Responses (Outputs)                   |
|-------------------------------------|-----------------------------------------------|
| setMaintenanceReminder              | reportMaintenanceReminderCommandStatus        |
| queryMaintenanceReminderCommandAck⊕ | reportMaintenanceReminderCommandAck           |
| cancelMaintenanceReminderCommand⊕   | reportMaintenanceReminderCancelCommandStatus⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.76.1 reportMaintenanceReminderCommandAck

**Description:** This operation is used to provide the MaintenanceReminder commanded values.

**Namespace:** UMAA::SO::MaintenanceReminderControl

**Topic:** MaintenanceReminderCommandAckReport

**Data Type:** MaintenanceReminderCommandAckReportType

**Table 256:** MaintenanceReminderCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                 | Attribute Description |
|-----------------------------------------------------------------------------|--------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                |                       |
| command                                                                     | MaintenanceReminderCommandType | The source command.   |

#### 6.1.76.2 reportMaintenanceReminderCommandStatus

**Description:** This operation is used to report the status of the maintenance reminder command.

**Namespace:** UMAA::SO::MaintenanceReminderControl

**Topic:** MaintenanceReminderCommandStatus

**Data Type:** MaintenanceReminderCommandStatusType

**Table 257:** MaintenanceReminderCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.76.3 setMaintenanceReminder**

**Description:** This operation is used to reset the maintenance reminder.

**Namespace:** UMAA::SO::MaintenanceReminderControl

**Topic:** MaintenanceReminderCommand

**Data Type:** MaintenanceReminderCommandType

**Table 258:** MaintenanceReminderCommandType Message Definition

| Attribute Name                                                    | Attribute Type              | Attribute Description                 |
|-------------------------------------------------------------------|-----------------------------|---------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                             |                                       |
| reminderID                                                        | <a href="#">NumericGUID</a> | An unique identifier of the reminder. |

**6.1.77 MaintenanceReminderReport**

The purpose of this service is to provide maintenance reminder details and summary.

**Table 259:** MaintenanceReminderReport Operations

| Service Requests (Inputs)              | Service Responses (Outputs)           |
|----------------------------------------|---------------------------------------|
| <a href="#">queryHourMeter</a> ⊕       | <a href="#">reportHourMeter</a>       |
| <a href="#">queryReminder</a> ⊕        | <a href="#">reportReminder</a>        |
| <a href="#">queryReminderSummary</a> ⊕ | <a href="#">reportReminderSummary</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

**6.1.77.1 reportHourMeter**

**Description:** This operation is used to report the cumulative operational (powered-on) minutes of the system or sub-system.

**Namespace:** UMAA::SO::MaintenanceReminderReport

**Topic:** HourMeterStatusReport

**Data Type:** HourMeterStatusReportType

**Table 260:** HourMeterStatusReportType Message Definition

| Attribute Name                                                    | Attribute Type                | Attribute Description                                              |
|-------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                               |                                                                    |
| elapsedMin                                                        | <a href="#">DurationHours</a> | The operational (powered-on) minutes for each system or subsystem. |

### 6.1.77.2 reportReminder

**Description:** This operation is used to report the status and configuration for the maintenance reminder.

**Namespace:** UMAA::SO::MaintenanceReminderReport

**Topic:** ReminderStatusReport

**Data Type:** ReminderStatusReportType

**Table 261:** ReminderStatusReportType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                                                                   |
|-------------------------------------------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                        |                                                                                         |
| descriptor                                                        | <a href="#">StringShortDescription</a> | A human-readable string describing the maintenance reminder.                            |
| elapsedTime                                                       | <a href="#">DurationHours</a>          | Current elapsed subsystem powered-on time since last reset.                             |
| reminderConfig                                                    | <a href="#">boolean</a>                | Indicate whether the associated maintenance reminder is not configured (set to 1).      |
| reminderID                                                        | <a href="#">NumericGUID</a>            | Unique identifier for each maintenance reminder.                                        |
| reminderStatus                                                    | <a href="#">boolean</a>                | Status indication whether the reminder is expired (set to 1) or not expired (set to 0). |
| serviceInterval                                                   | <a href="#">DurationHours</a>          | A reminder timer in minutes.                                                            |

### 6.1.77.3 reportReminderSummary

**Description:** This operation is used to report a simple status for each maintenance reminder.

**Namespace:** UMAA::SO::MaintenanceReminderReport

**Topic:** ReminderSummaryStatusReport

**Data Type:** ReminderSummaryStatusReportType

**Table 262:** ReminderSummaryStatusReportType Message Definition

| Attribute Name                                                  | Attribute Type              | Attribute Description                                                                   |
|-----------------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                             |                                                                                         |
| reminderExpired                                                 | <a href="#">boolean</a>     | Status indication whether the reminder is expired (set to 1) or not expired (set to 0). |
| reminderID                                                      | <a href="#">NumericGUID</a> | A unique identifier for maintenance reminder.                                           |

### 6.1.78 ManagementStateControl

The purpose of this service is to provide the control of the system or subsystem's life-cycle.

**Table 263:** ManagementStateControl Operations

| Service Requests (Inputs)                        | Service Responses (Outputs)                                |
|--------------------------------------------------|------------------------------------------------------------|
| <a href="#">setManagementState</a>               | <a href="#">reportManagementStateCommandStatus</a>         |
| <a href="#">queryManagementStateCommandAck</a> ⊕ | <a href="#">reportManagementStateCommandAck</a>            |
| <a href="#">cancelManagementStateCommand</a> ⊕   | <a href="#">reportManagementStateCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.78.1 reportManagementStateCommandAck

**Description:** This operation is used to report the commanded state of the system or subsystem life-cycle.

**Namespace:** [UMAA::SO::ManagementStateControl](#)

**Topic:** [ManagementStateCommandAckReport](#)

**Data Type:** [ManagementStateCommandAckReportType](#)

**Table 264:** ManagementStateCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                             | Attribute Description |
|-----------------------------------------------------------------------------|--------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                            |                       |
| command                                                                     | <a href="#">ManagementStateCommandType</a> | The source command.   |

#### 6.1.78.2 reportManagementStateCommandStatus

**Description:** This operation is used to report the status of the state of the system or subsystem life-cycle command.

**Namespace:** [UMAA::SO::ManagementStateControl](#)

**Topic:** [ManagementStateCommandStatus](#)

**Data Type:** ManagementStateCommandStatusType

**Table 265:** ManagementStateCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.78.3 setManagementState

**Description:** This operation is used to set the desired state of the system or subsystem life-cycle.

**Namespace:** UMAA::SO::ManagementStateControl

**Topic:** ManagementStateCommand

**Data Type:** ManagementStateCommandType

**Table 266:** ManagementStateCommandType Message Definition

| Attribute Name                                                    | Attribute Type                    | Attribute Description                                     |
|-------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                   |                                                           |
| state                                                             | <a href="#">CoreStateEnumType</a> | A desired state (shutdown, standby, resume, reset, etc.). |

### 6.1.79 ManagementStateReport

The purpose of this service is to report the system or subsystem's life-cycle.

**Table 267:** ManagementStateReport Operations

| Service Requests (Inputs)              | Service Responses (Outputs)           |
|----------------------------------------|---------------------------------------|
| <a href="#">queryManagementState</a> ⊕ | <a href="#">reportManagementState</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.79.1 reportManagementState

**Description:** This operation is used to report the current state of the system or subsystem life-cycle.

**Namespace:** UMAA::SO::ManagementStateReport

**Topic:** ManagementStateReport

**Data Type:** ManagementStateReportType

**Table 268:** ManagementStateReportType Message Definition

| Attribute Name                                                    | Attribute Type                    | Attribute Description                                    |
|-------------------------------------------------------------------|-----------------------------------|----------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                   |                                                          |
| state                                                             | <a href="#">CoreStateEnumType</a> | The current state of the system or subsystem life-cycle. |

### 6.1.80 MissionPlanCatalogControl

The purpose of this service is to provide the ability to save and retrieve stored mission plans (e.g. from a hard drive).

**Table 269:** MissionPlanCatalogControl Operations

| Service Requests (Inputs)                           | Service Responses (Outputs)                                   |
|-----------------------------------------------------|---------------------------------------------------------------|
| <a href="#">setMissionPlanCatalog</a>               | <a href="#">reportMissionPlanCatalogCommandStatus</a>         |
| <a href="#">queryMissionPlanCatalogCommandAck</a> ⊕ | <a href="#">reportMissionPlanCatalogCommandAck</a>            |
| <a href="#">cancelMissionPlanCatalogCommand</a> ⊕   | <a href="#">reportMissionPlanCatalogCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.80.1 reportMissionPlanCatalogCommandAck

**Description:** This operation is used to report the commanded mission plan and its metadata the Mission Plan Catalog.

**Namespace:** [UMAA::MM::MissionPlanCatalogControl](#)

**Topic:** [MissionPlanCatalogCommandAckReport](#)

**Data Type:** [MissionPlanCatalogCommandAckReportType](#)

**Table 270:** MissionPlanCatalogCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                                | Attribute Description |
|-----------------------------------------------------------------------------|-----------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                               |                       |
| command                                                                     | <a href="#">MissionPlanCatalogCommandType</a> | The source command.   |

#### 6.1.80.2 reportMissionPlanCatalogCommandStatus

**Description:** This operation is used to report the status of the Mission Plan Catalog.

**Namespace:** [UMAA::MM::MissionPlanCatalogControl](#)

**Topic:** MissionPlanCatalogCommandStatus

**Data Type:** MissionPlanCatalogCommandStatusType

**Table 271:** MissionPlanCatalogCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.80.3 setMissionPlanCatalog

**Description:** This operation is used to manage a mission plan in the Mission Plan Catalog.

**Namespace:** UMAA::MM::MissionPlanCatalogControl

**Topic:** MissionPlanCatalogCommand

**Data Type:** MissionPlanCatalogCommandType

**Table 272:** MissionPlanCatalogCommandType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                                                           |
|-------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                        |                                                                                 |
| action                                                            | <a href="#">PlanActionEnumType</a>     | The desired action to be taken on the mission plan in the mission plan catalog. |
| allocationStatus                                                  | <a href="#">boolean</a>                | The availability of the mission plan.                                           |
| assignedResource                                                  | <a href="#">NumericGUID</a>            | Describes the resource that the mission plan is assigned to.                    |
| domain                                                            | <a href="#">DomainEnumType</a>         | The domain that the mission plan is planned for.                                |
| format                                                            | <a href="#">StringShortDescription</a> | Indicates a file based or message based type of mission plan.                   |
| name                                                              | <a href="#">StringShortDescription</a> | The name used to store/retrieve the mission plan.                               |
| missionID*                                                        | <a href="#">NumericGUID</a>            | Identifies the associated mission plan.                                         |

### 6.1.81 NavigationRulesStatus

The purpose of this service is to provide the current navigation rules under which the vehicle is operating.

**Table 273:** NavigationRulesStatus Operations

| Service Requests (Inputs)              | Service Responses (Outputs)           |
|----------------------------------------|---------------------------------------|
| <a href="#">queryNavigationRules</a> ⊕ | <a href="#">reportNavigationRules</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.81.1 reportNavigationRules

**Description:** This operation is used to report the current navigation rules under which the vehicle is operating.

**Namespace:** UMAA::SA::NavigationRulesStatus

**Topic:** NavigationRulesReport

**Data Type:** NavigationRulesReportType

**Table 274:** NavigationRulesReportType Message Definition

| Attribute Name                                                  | Attribute Type                          | Attribute Description                                              |
|-----------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                         |                                                                    |
| currentRules                                                    | <a href="#">NavigationRulesEnumType</a> | The current navigation rules under which the vehicle is operating. |

#### 6.1.82 PanTiltJointEffortControl

The purpose of this service is to provide control of the low level pant tilt mechanism.

**Table 275:** PanTiltJointEffortControl Operations

| Service Requests (Inputs)                                            | Service Responses (Outputs)                                                    |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <a href="#">setPanTiltJointEffort</a>                                | <a href="#">reportPanTiltJointEffortCommandStatus</a>                          |
| <a href="#">queryPanTiltJointEffortCommandAck<math>\oplus</math></a> | <a href="#">reportPanTiltJointEffortCommandAck</a>                             |
| <a href="#">cancelPanTiltJointEffortCommand<math>\oplus</math></a>   | <a href="#">reportPanTiltJointEffortCancelCommandStatus<math>\oplus</math></a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.82.1 reportPanTiltJointEffortCommandAck

**Description:** This operation is used to report the percent effort that is currently being applied to the two joints of the pan tilt mechanism.

**Namespace:** UMAA::SEM::PanTiltJointEffortControl

**Topic:** PanTiltJointEffortCommandAckReport

**Data Type:** PanTiltJointEffortCommandAckReportType

**Table 276:** PanTiltJointEffortCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                                | Attribute Description |
|-----------------------------------------------------------------------------|-----------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                               |                       |
| command                                                                     | <a href="#">PanTiltJointEffortCommandType</a> | The source command.   |

**6.1.82.2 reportPanTiltJointEffortCommandStatus**

**Description:** This operation is used to report the status of the joint effort command.

**Namespace:** UMAA::SEM::PanTiltJointEffortControl

**Topic:** PanTiltJointEffortCommandStatus

**Data Type:** PanTiltJointEffortCommandStatusType

**Table 277:** PanTiltJointEffortCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.82.3 setPanTiltJointEffort**

**Description:** This operation is used to control the two joint actuators for a pan tilt mechanism. The consumer must perform a "cancel" of the command to initiate the end of command execution as this command has no determinate end of execution.

**Namespace:** UMAA::SEM::PanTiltJointEffortControl

**Topic:** PanTiltJointEffortCommand

**Data Type:** PanTiltJointEffortCommandType

**Table 278:** PanTiltJointEffortCommandType Message Definition

| Attribute Name                                                    | Attribute Type         | Attribute Description                                           |
|-------------------------------------------------------------------|------------------------|-----------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                        |                                                                 |
| panEffort                                                         | <a href="#">Effort</a> | The desired joint pan effort in percent of the pan mechanism.   |
| tiltEffort                                                        | <a href="#">Effort</a> | The desired joint tilt effort in percent of the tilt mechanism. |

### 6.1.83 PanTiltJointEffortStatus

The purpose of this service is to provide the status of the low level pant tilt mechanism.

**Table 279:** PanTiltJointEffortStatus Operations

| Service Requests (Inputs)                 | Service Responses (Outputs)              |
|-------------------------------------------|------------------------------------------|
| <a href="#">queryPanTiltJointEffort</a> ⊕ | <a href="#">reportPanTiltJointEffort</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.83.1 reportPanTiltJointEffort

**Description:** This operation is used to report the current the percent effort that is currently being applied to the two joints of the pan tilt mechanism.

**Namespace:** UMAA::SEM::PanTiltJointEffortStatus

**Topic:** PanTiltJointEffortReport

**Data Type:** PanTiltJointEffortReportType

**Table 280:** PanTiltJointEffortReportType Message Definition

| Attribute Name                                                  | Attribute Type         | Attribute Description                                              |
|-----------------------------------------------------------------|------------------------|--------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                        |                                                                    |
| panEffort                                                       | <a href="#">Effort</a> | The current percentage level of pan effort of the pan mechanism.   |
| tiltEffort                                                      | <a href="#">Effort</a> | The current percentage level of tilt effort of the tilt mechanism. |

### 6.1.84 PanTiltJointPositionControl

The purpose of this service is to provide the closed-loop joint position control.

**Table 281:** PanTiltJointPositionControl Operations

| Service Requests (Inputs)                             | Service Responses (Outputs)                                     |
|-------------------------------------------------------|-----------------------------------------------------------------|
| <a href="#">setPanTiltJointPosition</a>               | <a href="#">reportPanTiltJointPositionCommandStatus</a>         |
| <a href="#">queryPanTiltJointPositionCommandAck</a> ⊕ | <a href="#">reportPanTiltJointPositionCommandAck</a>            |
| <a href="#">cancelPanTiltJointPositionCommand</a> ⊕   | <a href="#">reportPanTiltJointPositionCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.84.1 reportPanTiltJointPositionCommandAck

**Description:** This operation is used to report the commanded joint position for a pan tilt mechanism.

**Namespace:** UMAA::SEM::PanTiltJointPositionControl

**Topic:** PanTiltJointPositionCommandAckReport

**Data Type:** PanTiltJointPositionCommandAckReportType

**Table 282:** PanTiltJointPositionCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                                  | Attribute Description |
|-----------------------------------------------------------------------------|-------------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                                 |                       |
| command                                                                     | <a href="#">PanTiltJointPositionCommandType</a> | The source command.   |

#### 6.1.84.2 reportPanTiltJointPositionCommandStatus

**Description:** This operation is used to report the pan tilt join position command.

**Namespace:** UMAA::SEM::PanTiltJointPositionControl

**Topic:** PanTiltJointPositionCommandStatus

**Data Type:** PanTiltJointPositionCommandStatusType

**Table 283:** PanTiltJointPositionCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.84.3 setPanTiltJointPosition

**Description:** This operation is used to set the desired joint position for a pan tilt mechanism.

**Namespace:** UMAA::SEM::PanTiltJointPositionControl

**Topic:** PanTiltJointPositionCommand

**Data Type:** PanTiltJointPositionCommandType

**Table 284:** PanTiltJointPositionCommandType Message Definition

| Attribute Name                                                    | Attribute Type | Attribute Description |
|-------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                |                       |

| Attribute Name | Attribute Type        | Attribute Description                             |
|----------------|-----------------------|---------------------------------------------------|
| pan            | <a href="#">Angle</a> | The desired joint pan position (-8 pi to +8 pi).  |
| tilt           | <a href="#">Angle</a> | The desired joint tilt position (-8 pi to +8 pi). |

### 6.1.85 PanTiltJointPositionStatus

The purpose of this service is to report the two joint angles of the pan tilt mechanism.

**Table 285:** PanTiltJointPositionStatus Operations

| Service Requests (Inputs)                        | Service Responses (Outputs)                     |
|--------------------------------------------------|-------------------------------------------------|
| <a href="#">queryPanTiltJointPositionState</a> ⊕ | <a href="#">reportPanTiltJointPositionState</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.85.1 reportPanTiltJointPositionState

**Description:** This operation is used to report the current position of the two joint angles of the pan tilt mechanism.

**Namespace:** UMAA::SEM::PanTiltJointPositionStatus

**Topic:** PanTiltJointPositionStateReport

**Data Type:** PanTiltJointPositionStateReportType

**Table 286:** PanTiltJointPositionStateReportType Message Definition

| Attribute Name                                                  | Attribute Type        | Attribute Description                     |
|-----------------------------------------------------------------|-----------------------|-------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                       |                                           |
| pan                                                             | <a href="#">Angle</a> | The current pan position (-8pi to +8pi).  |
| tilt                                                            | <a href="#">Angle</a> | The current tilt distance (-8pi to +8pi). |

### 6.1.86 PanTiltJointVelocityControl

The purpose of this service is to provide a closed-loop joint velocity control.

**Table 287:** PanTiltJointVelocityControl Operations

| Service Requests (Inputs)                             | Service Responses (Outputs)                                     |
|-------------------------------------------------------|-----------------------------------------------------------------|
| <a href="#">setPanTiltJointVelocity</a>               | <a href="#">reportPanTiltJointVelocityCommandStatus</a>         |
| <a href="#">queryPanTiltJointVelocityCommandAck</a> ⊕ | <a href="#">reportPanTiltJointVelocityCommandAck</a>            |
| <a href="#">cancelPanTiltJointVelocityCommand</a> ⊕   | <a href="#">reportPanTiltJointVelocityCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.86.1 reportPanTiltJointVelocityCommandAck

**Description:** This operation is used to report the commanded joint velocity values for a pan tilt mechanism.

**Namespace:** UMAA::SEM::PanTiltJointVelocityControl

**Topic:** PanTiltJointVelocityCommandAckReport

**Data Type:** PanTiltJointVelocityCommandAckReportType

**Table 288:** PanTiltJointVelocityCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                                  | Attribute Description |
|-----------------------------------------------------------------------------|-------------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                                 |                       |
| command                                                                     | <a href="#">PanTiltJointVelocityCommandType</a> | The source command.   |

#### 6.1.86.2 reportPanTiltJointVelocityCommandStatus

**Description:** This operation is used to report the status of the joint velocity command.

**Namespace:** UMAA::SEM::PanTiltJointVelocityControl

**Topic:** PanTiltJointVelocityCommandStatus

**Data Type:** PanTiltJointVelocityCommandStatusType

**Table 289:** PanTiltJointVelocityCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.86.3 setPanTiltJointVelocity

**Description:** This operation is used to control the joint velocity for a pan tilt mechanism. The consumer must perform a "cancel" of the command to initiate the end of command execution as this command has no determinate end of execution.

**Namespace:** UMAA::SEM::PanTiltJointVelocityControl

**Topic:** PanTiltJointVelocityCommand

**Data Type:** PanTiltJointVelocityCommandType

**Table 290:** PanTiltJointVelocityCommandType Message Definition

| Attribute Name                                                    | Attribute Type                        | Attribute Description                           |
|-------------------------------------------------------------------|---------------------------------------|-------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                       |                                                 |
| panVelocity                                                       | <a href="#">PanTiltJointAngleRate</a> | The current joint velocity of a pan mechanism.  |
| tiltVelocity                                                      | <a href="#">PanTiltJointAngleRate</a> | The current joint velocity of a tilt mechanism. |

**6.1.87 PanTiltJointVelocityStatus**

The purpose of this service is to report the velocity of the two joint angles of the pan tilt mechanism.

**Table 291:** PanTiltJointVelocityStatus Operations

| Service Requests (Inputs)                        | Service Responses (Outputs)                     |
|--------------------------------------------------|-------------------------------------------------|
| <a href="#">queryPanTiltJointVelocityState</a> ⊕ | <a href="#">reportPanTiltJointVelocityState</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

**6.1.87.1 reportPanTiltJointVelocityState**

**Description:** This operation is used to report the current joint velocity values for a pan tilt mechanism.

**Namespace:** UMAA::SEM::PanTiltJointVelocityStatus

**Topic:** PanTiltJointVelocityReport

**Data Type:** PanTiltJointVelocityReportType

**Table 292:** PanTiltJointVelocityReportType Message Definition

| Attribute Name                                                  | Attribute Type                        | Attribute Description                             |
|-----------------------------------------------------------------|---------------------------------------|---------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                       |                                                   |
| panVelocity                                                     | <a href="#">PanTiltJointAngleRate</a> | The current pan velocity of a pan tilt mechanism. |
| tiltVelocity                                                    | <a href="#">PanTiltJointAngleRate</a> | The current tilt rate of a pan tilt mechanism.    |

**6.1.88 PanTiltSpecs**

The purpose of this service is to report the physical specifications of a pan tilt unit on board of the vehicle.

**Table 293:** PanTiltSpecs Operations

| Service Requests (Inputs)           | Service Responses (Outputs)        |
|-------------------------------------|------------------------------------|
| <a href="#">queryPanTiltSpecs</a> ⊕ | <a href="#">reportPanTiltSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.88.1 reportPanTiltSpecs

**Description:** This operation is used report the physical specifications of the pan tilt unit on board of the vehicle.

**Namespace:** UMAA::SEM::PanTiltSpecs

**Topic:** PanTiltSpecsReport

**Data Type:** PanTiltSpecsReportType

**Table 294:** PanTiltSpecsReportType Message Definition

| Attribute Name                                                  | Attribute Type                                | Attribute Description                                                                                            |
|-----------------------------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                               |                                                                                                                  |
| baseOffset                                                      | <a href="#">Position3DBodyXYZ</a>             | The pan tilt coordinate system (X, Y, Z) measured with respect to vehicle coordinate system (-30m to +30m).      |
| baseOrientation                                                 | <a href="#">OrientationQuaternion</a>         | The orientation of the pan tilt coordinate system measured with respect to vehicle coordinate system (-1 to +1). |
| panMax                                                          | <a href="#">RevoluteJointAngleMeasurement</a> | The maximum pan angle.                                                                                           |
| panMaxSpeed                                                     | <a href="#">PrismaticJointSpeed</a>           | The maximum pan speed.                                                                                           |
| panMin                                                          | <a href="#">RevoluteJointAngleMeasurement</a> | The minimum pan angle.                                                                                           |
| tiltMax                                                         | <a href="#">RevoluteJointAngleMeasurement</a> | The maximum tilt distance.                                                                                       |
| tiltMaxSpeed                                                    | <a href="#">PrismaticJointSpeed</a>           | The maximum tilt speed.                                                                                          |
| tiltMin                                                         | <a href="#">RevoluteJointAngleMeasurement</a> | The minimum tilt distance.                                                                                       |

#### 6.1.89 PathReporterSpecs

The purpose of this service is to provide the capabilities of the path reporting mechanism of the vehicle.

**Table 295:** PathReporterSpecs Operations

| Service Requests (Inputs)                       | Service Responses (Outputs)             |
|-------------------------------------------------|-----------------------------------------|
| <a href="#">queryPathReporterSpecs</a> $\oplus$ | <a href="#">reportPathReporterSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.89.1 reportPathReporterSpecs

**Description:** This operation is used to report the capabilities.

**Namespace:** UMAA::SA::PathReporterSpecs

**Topic:** PathReporterSpecsReport

**Data Type:** PathReporterSpecsReportType

**Table 296:** PathReporterSpecsReportType Message Definition

| Attribute Name                                                    | Attribute Type                                                | Attribute Description                    |
|-------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                                               |                                          |
| pathReporters                                                     | sequence< <a href="#">PathReporterType</a><br>e> max size = 4 | A list of capabilities of path reporter. |

### 6.1.90 PathReporterStatus

The purpose of this service is to provide a mechanism for reporting the past and/or future expected path of the vehicle. The service is used in cooperation with Global Waypoint Driver, Local Waypoint Driver, Global Waypoint List Driver, Local Waypoint List Driver, Global Pose Sensor and/or Local Pose Sensor. The amount of data reported may be limited by specifying a maximum number of data points, maximum time, maximum distance, and/or path resolution, within the limits of the implementation's reported capabilities. Note that the historical path is assumed to be represented by a FIFO queue. As a result, the Report Path message may be limited by the storage capabilities of the underlying implementation to reporting only the most recent data, e.g. the points nearest the current position. Older data may be discarded as needed by the implementation. Such limits should be specified by the PathReporterSpecs service. Also, note that the future path may be valid only at that instance in time. It represents the current planned path, at the given resolution. However, some waypoint drivers may frequently update the planned path, based on new information about the environment. As a result, planned path information may quickly become stale. Furthermore, the planned path represents the actual path the vehicle expects to follow. It does not replace the Waypoint Driver's Query Waypoint messages. Rather, it provides additional information about how the vehicle plans to achieve the desired waypoints.

**Table 297:** PathReporterStatus Operations

| Service Requests (Inputs)           | Service Responses (Outputs)        |
|-------------------------------------|------------------------------------|
| <a href="#">queryPathReporter</a> ⊕ | <a href="#">reportPathReporter</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.90.1 reportPathReporter

**Description:** This operation is used to report the current path.

**Namespace:** UMAA::SA::PathReporterStatus

**Topic:** PathReporterReport

**Data Type:** PathReporterReportType

**Table 298:** PathReporterReportType Message Definition

| Attribute Name                                                  | Attribute Type                            | Attribute Description                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                           |                                                                                                                                                                                                                                                       |
| historicalGlobalPaths→listID                                    | LargeList< <a href="#">WaypointType</a> > | Historical Global Path. This attribute is implemented as a large list, see <a href="#">subsection 3.8</a> for an explanation. The associated topic is <code>UMAA::SA::PathReporterStatus::PathReporterReportHistoricalGlobalPathsListElement</code> . |
| historicalLocalPaths→listID                                     | LargeList< <a href="#">WaypointType</a> > | Historical Local Path. This attribute is implemented as a large list, see <a href="#">subsection 3.8</a> for an explanation. The associated topic is <code>UMAA::SA::PathReporterStatus::PathReporterReportHistoricalLocalPathsListElement</code> .   |
| plannedGlobalPaths→listID                                       | LargeList< <a href="#">WaypointType</a> > | Planned Global Path. This attribute is implemented as a large list, see <a href="#">subsection 3.8</a> for an explanation. The associated topic is <code>UMAA::SA::PathReporterStatus::PathReporterReportPlannedGlobalPathsListElement</code> .       |
| plannedLocalPaths→listID                                        | LargeList< <a href="#">WaypointType</a> > | Planned Local Path. This attribute is implemented as a large list, see <a href="#">subsection 3.8</a> for an explanation. The associated topic is <code>UMAA::SA::PathReporterStatus::PathReporterReportPlannedLocalPathsListElement</code> .         |

### 6.1.91 PlatformModeControl

The purpose of this service is to provide a mechanism to manage the vehicle's mode of operation.

**Table 299:** PlatformModeControl Operations

| Service Requests (Inputs)                     | Service Responses (Outputs)                             |
|-----------------------------------------------|---------------------------------------------------------|
| <a href="#">setPlatformMode</a>               | <a href="#">reportPlatformModeCommandStatus</a>         |
| <a href="#">queryPlatformModeCommandAck</a> ⊕ | <a href="#">reportPlatformModeCommandAck</a>            |
| <a href="#">cancelPlatformModeCommand</a> ⊕   | <a href="#">reportPlatformModeCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.91.1 reportPlatformModeCommandAck

**Description:** This operation is used to provide the PlatformMode commanded values.

**Namespace:** `UMAA::SO::PlatformModeControl`

**Topic:** `PlatformModeCommandAckReport`

**Data Type:** `PlatformModeCommandAckReportType`

**Table 300:** PlatformModeCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                          | Attribute Description |
|-----------------------------------------------------------------------------|-----------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                         |                       |
| command                                                                     | <a href="#">PlatformModeCommandType</a> | The source command.   |

**6.1.91.2 reportPlatformModeCommandStatus**

**Description:** This operation is used to report the status of the platform mode command of the vehicle.

**Namespace:** UMAA::SO::PlatformModeControl

**Topic:** PlatformModeCommandStatus

**Data Type:** PlatformModeCommandStatusType

**Table 301:** PlatformModeCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.91.3 setPlatformMode**

**Description:** This operation is used to set the platform mode of a vehicle.

**Namespace:** UMAA::SO::PlatformModeControl

**Topic:** PlatformModeCommand

**Data Type:** PlatformModeCommandType

**Table 302:** PlatformModeCommandType Message Definition

| Attribute Name                                                    | Attribute Type                       | Attribute Description |
|-------------------------------------------------------------------|--------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                      |                       |
| mode                                                              | <a href="#">PlatformModeEnumType</a> | Platform Mode.        |

**6.1.92 PlatformModeSpecs**

The purpose of this service is to provide a mechanism to report the modes of operation the vehicle supports.

**Table 303:** PlatformModeSpecs Operations

| Service Requests (Inputs)                | Service Responses (Outputs)             |
|------------------------------------------|-----------------------------------------|
| <a href="#">queryPlatformModeSpecs</a> ⊕ | <a href="#">reportPlatformModeSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.92.1 reportPlatformModeSpecs

**Description:** This operation is used to report the platform modes supported by the vehicle.

**Namespace:** UMAA::SO::PlatformModeSpecs

**Topic:** PlatformModeSpecsReport

**Data Type:** PlatformModeSpecsReportType

**Table 304:** PlatformModeSpecsReportType Message Definition

| Attribute Name                                                  | Attribute Type          | Attribute Description                    |
|-----------------------------------------------------------------|-------------------------|------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                         |                                          |
| supportedMaintenance                                            | <a href="#">boolean</a> | The supported/unsupported platform mode. |
| supportedStandardOperating                                      | <a href="#">boolean</a> | The supported/unsupported platform mode. |
| supportedTraining                                               | <a href="#">boolean</a> | The supported/unsupported platform mode. |

#### 6.1.93 PlatformModeStatus

The purpose of this service is to provide a mechanism to report the vehicle's mode of operation.

**Table 305:** PlatformModeStatus Operations

| Service Requests (Inputs)           | Service Responses (Outputs)        |
|-------------------------------------|------------------------------------|
| <a href="#">queryPlatformMode</a> ⊕ | <a href="#">reportPlatformMode</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.93.1 reportPlatformMode

**Description:** This operation is used to report the platform mode of the vehicle.

**Namespace:** UMAA::SO::PlatformModeStatus

**Topic:** PlatformModeReport

**Data Type:** PlatformModeReportType

**Table 306:** PlatformModeReportType Message Definition

| Attribute Name                                                    | Attribute Type                                 | Attribute Description               |
|-------------------------------------------------------------------|------------------------------------------------|-------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                                |                                     |
| mode                                                              | <a href="#">PlatformModeEnumType</a>           | Platform Mode.                      |
| status                                                            | <a href="#">PlatformModeTransitionEnumType</a> | Status of platform mode transition. |

#### 6.1.94 PowerControl

The purpose of this service is to provide the power control of all subsystems on the vehicles.

**Table 307:** PowerControl Operations

| Service Requests (Inputs)              | Service Responses (Outputs)                      |
|----------------------------------------|--------------------------------------------------|
| <a href="#">setPower</a>               | <a href="#">reportPowerCommandStatus</a>         |
| <a href="#">queryPowerCommandAck</a> ⊕ | <a href="#">reportPowerCommandAck</a>            |
| <a href="#">cancelPowerCommand</a> ⊕   | <a href="#">reportPowerCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

##### 6.1.94.1 reportPowerCommandAck

**Description:** This operation is used to report the commanded power state of the subsystems on the vehicle.

**Namespace:** UMAA::EO::PowerControl

**Topic:** PowerCommandAckReport

**Data Type:** PowerCommandAckReportType

**Table 308:** PowerCommandAckReportType Message Definition

| Attribute Name                                                               | Attribute Type                   | Attribute Description |
|------------------------------------------------------------------------------|----------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACCommandStatusBase</a> |                                  |                       |
| command                                                                      | <a href="#">PowerCommandType</a> | The source command.   |

##### 6.1.94.2 reportPowerCommandStatus

**Description:** This operation is used to report the status of the power control command message.

**Namespace:** UMAA::EO::PowerControl

**Topic:** PowerCommandStatus

**Data Type:** PowerCommandStatusType

**Table 309:** PowerCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.94.3 setPower

**Description:** This operation is used to control the power state of the specified subsystems using the subsystem identifiers on the vehicle.

**Namespace:** UMAA::EO::PowerControl

**Topic:** PowerCommand

**Data Type:** PowerCommandType

**Table 310:** PowerCommandType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                     |
|-------------------------------------------------------------------|----------------------------------------|-------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                        |                                           |
| identification                                                    | <a href="#">StringShortDescription</a> | The name or description of the subsystem. |
| state                                                             | <a href="#">IgnitionStateEnumType</a>  | The desired power state of the subsystem. |

### 6.1.95 PowerStatus

The purpose of this service is to provide the current power status of all subsystems on the vehicles.

**Table 311:** PowerStatus Operations

| Service Requests (Inputs)    | Service Responses (Outputs) |
|------------------------------|-----------------------------|
| <a href="#">queryPower</a> ⊕ | <a href="#">reportPower</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.95.1 reportPower

**Description:** This operation is used to report the current power status of the subsystems on the vehicle.

**Namespace:** UMAA::EO::PowerStatus

**Topic:** PowerReport

**Data Type:** PowerReportType

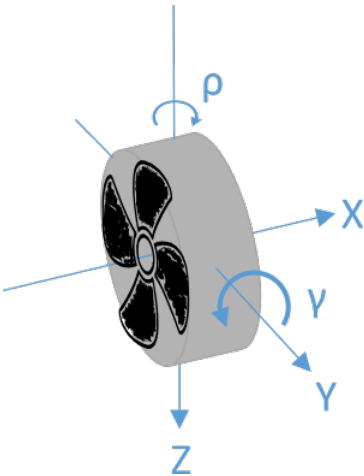
**Table 312:** PowerReportType Message Definition

| Attribute Name                                                    | Attribute Type                          | Attribute Description             |
|-------------------------------------------------------------------|-----------------------------------------|-----------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                         |                                   |
| name                                                              | <a href="#">StringShortDescription</a>  | The description of the subsystem. |
| state                                                             | <a href="#">PowerPlantStateEnumType</a> | Describes the power state.        |

**6.1.96 PropulsorControl**

The purpose of this service is to provide the operations and interfaces to control the vehicle propulsors. A propulsor is assumed to be any mechanical device that gives propulsion, such as thrusters, propellers, water jets, etc. that is either fixed or has up to two articulations.

The propulsor coordinate reference frame is defined where the x-axis is along the direction of the shaft axis, the y-axis is perpendicular to the shaft axis, and the z-axis is defined by a right-handed coordinate system:



**Figure 38:** The propulsor coordinate reference frame

A positive RPM value produces motion in the positive x-axis direction, and a negative RPM value produces motion in the negative x-axis direction. Note that unless the propulsor coordinate reference frame is aligned with the vehicle coordinate reference frame, this does not necessarily result in forward and backward motion of the vehicle.

**Table 313:** PropulsorControl Operations

| Service Requests (Inputs)                  | Service Responses (Outputs)                          |
|--------------------------------------------|------------------------------------------------------|
| <a href="#">setPropulsor</a>               | <a href="#">reportPropulsorCommandStatus</a>         |
| <a href="#">queryPropulsorCommandAck</a> ⊕ | <a href="#">reportPropulsorCommandAck</a>            |
| <a href="#">cancelPropulsorCommand</a> ⊕   | <a href="#">reportPropulsorCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.96.1 reportPropulsorCommandAck

**Description:** This operation is used to provide the Propulsor commanded values.

**Namespace:** UMAA::EO::PropulsorControl

**Topic:** PropulsorCommandAckReport

**Data Type:** PropulsorCommandAckReportType

**Table 314:** PropulsorCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                       | Attribute Description |
|-----------------------------------------------------------------------------|--------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                      |                       |
| command                                                                     | <a href="#">PropulsorCommandType</a> | The source command.   |

#### 6.1.96.2 reportPropulsorCommandStatus

**Description:** This operation is used to report the status of the propulsor configuration command.

**Namespace:** UMAA::EO::PropulsorControl

**Topic:** PropulsorCommandStatus

**Data Type:** PropulsorCommandStatusType

**Table 315:** PropulsorCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.96.3 setPropulsor

**Description:** This operation is used to control the propulsor of the vehicle. The consumer must perform a "cancel" of the command to initiate the end of command execution as this command has no determinate end of execution.

**Namespace:** UMAA::EO::PropulsorControl

**Topic:** PropulsorCommand

**Data Type:** PropulsorCommandType

**Table 316:** PropulsorCommandType Message Definition

| Attribute Name                                                    | Attribute Type                                          | Attribute Description                                                                      |
|-------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                                         |                                                                                            |
| gamma†                                                            | <a href="#">GammaAnglePropulsorRequirement</a>          | Sets the angle of a propulsor about the y-axis with one or two articulations.              |
| propellorPitch†                                                   | <a href="#">PropellerPitchAnglePropulsorRequirement</a> | Sets the angle of the propellor pitch for propulsors that have a variable pitch propellor. |
| propulsion                                                        | <a href="#">EngineRPMSpeedRequirement</a>               | Sets the speed of the propulsor.                                                           |
| rho†                                                              | <a href="#">RhoAnglePropulsorRequirement</a>            | Sets the angle of a propulsor about the z-axis with one or two articulations.              |

### 6.1.97 PropulsorSpecs

The purpose of this service is to provide the operations and interfaces to report the specifications of the vehicle propulsors. The propulsor coordinate reference frame is defined where the x-axis is along the direction of the shaft axis, the y-axis is perpendicular to the shaft axis, and the z-axis is defined by a right-handed coordinate system:

(Figure 38)

A positive RPM value produces motion in the positive x-axis direction, and a negative RPM value produces motion in the negative x-axis direction. Note that unless the propulsor coordinate reference frame is aligned with the vehicle coordinate reference frame, this does not necessarily result in forward and backward motion of the vehicle.

**Table 317:** PropulsorSpecs Operations

| Service Requests (Inputs)             | Service Responses (Outputs)          |
|---------------------------------------|--------------------------------------|
| <a href="#">queryPropulsorSpecs</a> ⊕ | <a href="#">reportPropulsorSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.97.1 reportPropulsorSpecs

**Description:** This operation is used to report the specifications of the propulsor of the vehicle.

**Namespace:** [UMAA::EO::PropulsorSpecs](#)

**Topic:** [PropulsorSpecsReport](#)

**Data Type:** [PropulsorSpecsReportType](#)

**Table 318:** PropulsorSpecsReportType Message Definition

| Attribute Name                                                    | Attribute Type          | Attribute Description                                       |
|-------------------------------------------------------------------|-------------------------|-------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                         |                                                             |
| counterRotator                                                    | <a href="#">boolean</a> | If true, specifies that the propulsor is a counter rotator. |

| Attribute Name        | Attribute Type                                          | Attribute Description                                                                                                                    |
|-----------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| gamma†                | <a href="#">GammaAnglePropulsorRequirement</a>          | Specifies an upper and lower gamma angle limit for the propulsor; attribute is not defined when the propulsor angle is fixed.            |
| name                  | <a href="#">StringShortDescription</a>                  | The name of the propulsor unit.                                                                                                          |
| orientation           | <a href="#">Orientation3DPlatformType</a>               | Specifies the rotation offset of the propulsor coordinate reference frame with respect to the vehicle coordinate reference frame.        |
| position              | <a href="#">Position3DBodyXYZ</a>                       | Specifies the position offset of the propulsor coordinate reference frame with respect to the vehicle coordinate reference frame.        |
| propellorPitch†       | <a href="#">PropellerPitchAnglePropulsorRequirement</a> | Specifies an upper and lower angle limit for the propeller angle; attribute is not defined for propellers that have static pitch angles. |
| propulsionLowerLimit† | <a href="#">GroundSpeed</a>                             | Specifies a lower speed limit for propulsors that are reversible; attribute is not defined for propulsors that are not reversible.       |
| propulsionUpperLimit  | <a href="#">GroundSpeed</a>                             | Specifies an upper speed limit for the propulsor.                                                                                        |
| rho†                  | <a href="#">RhoAnglePropulsorRequirement</a>            | Specifies an upper and lower rho angle limit for the propulsor; attribute is not defined when the propulsor angle is fixed.              |

### 6.1.98 PropulsorStatus

The purpose of this service is to provide the operations and interfaces to monitor the status of the vehicle propulsors. The propulsor coordinate reference frame is defined where the x-axis is along the direction of the shaft axis, the y-axis is perpendicular to the shaft axis, and the z-axis is defined by a right-handed coordinate system:

(Figure 38)

A positive RPM value produces motion in the positive x-axis direction, and a negative RPM value produces motion in the negative x-axis direction. Note that unless the propulsor coordinate reference frame is aligned with the vehicle coordinate reference frame, this does not necessarily result in forward and backward motion of the vehicle.

**Table 319:** PropulsorStatus Operations

| Service Requests (Inputs)        | Service Responses (Outputs)     |
|----------------------------------|---------------------------------|
| <a href="#">queryPropulsor</a> ⊕ | <a href="#">reportPropulsor</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.98.1 reportPropulsor

**Description:** This operation is used to report the current status of the propulsor on the vehicle.

**Namespace:** UMAA::EO::PropulsorStatus

**Topic:** PropulsorReport

**Data Type:** PropulsorReportType

**Table 320:** PropulsorReportType Message Definition

| Attribute Name                                                    | Attribute Type                                          | Attribute Description                                                                      |
|-------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                                         |                                                                                            |
| gamma†                                                            | <a href="#">GammaAnglePropulsorRequirement</a>          | Sets the angle of a propulsor about the y-axis with one or two articulations.              |
| propellorPitch†                                                   | <a href="#">PropellerPitchAnglePropulsorRequirement</a> | Sets the angle of the propellor pitch for propulsors that have a variable pitch propellor. |
| propulsion                                                        | <a href="#">EngineRPMsSpeedRequirement</a>              | Sets the speed of the propulsor.                                                           |
| rho†                                                              | <a href="#">RhoAnglePropulsorRequirement</a>            | Sets the angle of a propulsor about the z-axis with one or two articulations.              |

### 6.1.99 RangeConfig

The purpose of this service is to configure the proximity sensors of the vehicle.

**Table 321:** RangeConfig Operations

| Service Requests (Inputs)             | Service Responses (Outputs)                            |
|---------------------------------------|--------------------------------------------------------|
| <a href="#">setRangeConfig</a>        | <a href="#">reportRangeConfigCommandStatus</a>         |
| <a href="#">cancelRangeConfig</a> ⊕   | <a href="#">reportRangeCancelConfigCommandStatus</a> ⊕ |
| <a href="#">queryRangeConfig</a> ⊕    | <a href="#">reportRangeConfig</a>                      |
| <a href="#">queryRangeConfigAck</a> ⊕ | <a href="#">reportRangeConfigAck</a>                   |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.99.1 reportRangeConfig

**Description:** This operation is used to report the current configuration of the range.

**Namespace:** [UMAA::SA::RangeConfig](#)

**Topic:** [RangeConfigReport](#)

**Data Type:** [RangeConfigReportType](#)

**Table 322:** RangeConfigReportType Message Definition

| Attribute Name                                                    | Attribute Type                | Attribute Description                                                                         |
|-------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                               |                                                                                               |
| horizontalFOVStartAngle                                           | <a href="#">RelativeAngle</a> | The current horizontal Field of View (FOV) starting angle in fixed coordinate system +Z axis. |
| horizontalFOVStopAngle                                            | <a href="#">RelativeAngle</a> | The current horizontal Field of View (FOV) stop angle in fixed coordinate system +Z axis.     |

| Attribute Name        | Attribute Type                      | Attribute Description                                                                       |
|-----------------------|-------------------------------------|---------------------------------------------------------------------------------------------|
| maxRange              | <a href="#">MinMaxRangeType</a>     | The current maximum range of data points.                                                   |
| minRange              | <a href="#">MinMaxRangeType</a>     | The current minimum range of data points.                                                   |
| rangeError            | <a href="#">RangeErrorType</a>      | The range error code and description.                                                       |
| status                | <a href="#">PowerStatusEnumType</a> | The current power status of the sensor.                                                     |
| updateRate            | <a href="#">RangeTypeFrequency</a>  | The current update rate of the range.                                                       |
| verticalFOVStartAngle | <a href="#">RelativeAngle</a>       | The current vertical Field of View (FOV) starting angle in fixed coordinate system +Y axis. |
| verticalFOVStopAngle  | <a href="#">RelativeAngle</a>       | The current vertical Field of View (FOV) stop angle in fixed coordinate system +Y axis.     |

### 6.1.99.2 reportRangeConfigAck

**Description:** This operation is used to report the current Range configuration.

**Namespace:** UMAA::SA::RangeConfig

**Topic:** RangeConfigAckReport

**Data Type:** RangeConfigAckReportType

**Table 323:** RangeConfigAckReportType Message Definition

| Attribute Name                                                  | Attribute Type                         | Attribute Description     |
|-----------------------------------------------------------------|----------------------------------------|---------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                        |                           |
| config                                                          | <a href="#">RangeConfigCommandType</a> | The source configuration. |

### 6.1.99.3 reportRangeConfigCommandStatus

**Description:** This operation is used to report the current status of setting the configuration of the range.

**Namespace:** UMAA::SA::RangeConfig

**Topic:** RangeConfigCommandStatus

**Data Type:** RangeConfigCommandStatusType

**Table 324:** RangeConfigCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.99.4 setRangeConfig

**Description:** This operation is used to set the configuration of a range.

**Namespace:** UMAA::SA::RangeConfig

**Topic:** RangeConfigCommand

**Data Type:** RangeConfigCommandType

**Table 325:** RangeConfigCommandType Message Definition

| Attribute Name                                                     | Attribute Type                      | Attribute Description                                                                           |
|--------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACCommand</a> |                                     |                                                                                                 |
| horizontalFOVStartAngle                                            | <a href="#">RelativeAngle</a>       | The commanded horizontal Field of View (FOV) starting angle in fixed coordinate system +Z axis. |
| horizontalFOVStopAngle                                             | <a href="#">RelativeAngle</a>       | The commanded horizontal Field of View (FOV) stop angle in fixed coordinate system +Z axis.     |
| maxRange                                                           | <a href="#">MinMaxRangeType</a>     | The commanded maximum range of data points.                                                     |
| minRange                                                           | <a href="#">MinMaxRangeType</a>     | The commanded minimum range of data points.                                                     |
| rangeError                                                         | <a href="#">RangeErrorType</a>      | The commanded range error code and description.                                                 |
| status                                                             | <a href="#">PowerStatusEnumType</a> | The commanded power status of the sensor.                                                       |
| updateRate                                                         | <a href="#">RangeTypeFrequency</a>  | The commanded update rate of the range.                                                         |
| verticalFOVStartAngle                                              | <a href="#">RelativeAngle</a>       | The commanded vertical Field of View (FOV) starting angle in fixed coordinate system +Y axis.   |
| verticalFOVStopAngle                                               | <a href="#">RelativeAngle</a>       | The commanded vertical Field of View (FOV) stop angle in fixed coordinate system +Y axis.       |

#### 6.1.100 RangeSpecs

The purpose of this service is to provide the specifications of the proximity sensors on the vehicle.

**Table 326:** RangeSpecs Operations

| Service Requests (Inputs)         | Service Responses (Outputs)      |
|-----------------------------------|----------------------------------|
| <a href="#">queryRangeSpecs</a> ⊕ | <a href="#">reportRangeSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

##### 6.1.100.1 reportRangeSpecs

**Description:** This operation is used to report the capabilities of the range.

**Namespace:** UMAA::SA::RangeSpecs

**Topic:** RangeSpecsReport

**Data Type:** RangeSpecsReportType

**Table 327:** RangeSpecsReportType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                                                                         |
|-------------------------------------------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                        |                                                                                               |
| coordinateTransformation                                          | <a href="#">boolean</a>                | The unsupported/supported coordinate transformation.                                          |
| maxHorizontalFOVStopAngle                                         | <a href="#">RelativeAngle</a>          | The maximum horizontal Field of View (FOV) stop angle in fixed coordinate system +Z axis.     |
| maxRange                                                          | <a href="#">MinMaxRangeType</a>        | The range of the data points.                                                                 |
| maxUpdateRate                                                     | <a href="#">FrequencyHertz</a>         | The data collection rate of the sensor.                                                       |
| maxVerticalFOVStopAngle                                           | <a href="#">RelativeAngle</a>          | The maximum vertical Field of View (FOV) stop angle in fixed coordinate system +Y axis.       |
| minHorizontalFOVStartAngle                                        | <a href="#">RelativeAngle</a>          | The minimum horizontal Field of View (FOV) starting angle in fixed coordinate system +Z axis. |
| minRange                                                          | <a href="#">MinMaxRangeType</a>        | The range of the data points.                                                                 |
| minUpdateRate                                                     | <a href="#">FrequencyHertz</a>         | The data collection rate of the sensor.                                                       |
| minVerticalFOVStartAngle                                          | <a href="#">RelativeAngle</a>          | The minimum vertical Field of View (FOV) starting angle in fixed coordinate system +Y axis.   |
| name                                                              | <a href="#">StringShortDescription</a> | Name of the range.                                                                            |
| stateActive                                                       | <a href="#">boolean</a>                | The unsupported/supported active state.                                                       |
| stateOff                                                          | <a href="#">boolean</a>                | The unsupported/supported off state.                                                          |
| stateStandby                                                      | <a href="#">boolean</a>                | The unsupported/supported standby state.                                                      |
| supportedBzip2                                                    | <a href="#">boolean</a>                | The unsupported/supported bzip2 compression.                                                  |
| supportedDeflated                                                 | <a href="#">boolean</a>                | The unsupported/supported deflate compression.                                                |
| supportedLZMA                                                     | <a href="#">boolean</a>                | The unsupported/supported LZMA compression.                                                   |
| supportedNoCompression                                            | <a href="#">boolean</a>                | The unsupported/supported data compression.                                                   |

### 6.1.101 RangeStatus

The purpose of this service is to provide information from the proximity sensors of the vehicle. Data can be reported in both a compressed and uncompressed format.

**Table 328:** RangeStatus Operations

| Service Requests (Inputs)    | Service Responses (Outputs) |
|------------------------------|-----------------------------|
| <a href="#">queryRange</a> ⊕ | <a href="#">reportRange</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.101.1 reportRange

**Description:** This operation is used to report data of the range.

**Namespace:** UMAA::SA::RangeStatus

**Topic:** RangeReport

**Data Type:** RangeReportType

**Table 329:** RangeReportType Message Definition

| Attribute Name                                                   | Attribute Type                                     | Attribute Description                                                                                                                                                                                                                         |
|------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAAStatus</a> |                                                    |                                                                                                                                                                                                                                               |
| coordinateSystem                                                 | <a href="#">CoordinateSystemEnumType</a>           | The coordinate system.                                                                                                                                                                                                                        |
| dataPoints→setID                                                 | <a href="#">LargeSet&lt;RangeDataPointType&gt;</a> | List of data points collected by range. This attribute is implemented as a large set, see <a href="#">subsection 3.8</a> for an explanation. The associated topic is <a href="#">UMAA::SA::RangeStatus::RangeReportDataPointsSetElement</a> . |
| errorMessage                                                     | <a href="#">StringShortDescription</a>             | The human-readable error message.                                                                                                                                                                                                             |
| rangeErrorCode                                                   | <a href="#">RangeErrorCodeEnumType</a>             | The error code.                                                                                                                                                                                                                               |

### 6.1.102 RelativeContactReport

The purpose of this service is to provide the vehicles and/or the operator with the contact (manmade object) related data relative to ownship for situational awareness in the operational area.

**Table 330:** RelativeContactReport Operations

| Service Requests (Inputs)              | Service Responses (Outputs)           |
|----------------------------------------|---------------------------------------|
| <a href="#">queryRelativeContact</a> ⊕ | <a href="#">reportRelativeContact</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.102.1 reportRelativeContact

**Description:** This operation is a response to retrieve the current contact data relative to ownship.

**Namespace:** UMAA::SA::RelativeContactReport

**Topic:** RelativeContactReport

**Data Type:** RelativeContactReportType

**Table 331:** RelativeContactReportType Message Definition

| Attribute Name                                                   | Attribute Type | Attribute Description |
|------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAAStatus</a> |                |                       |

| Attribute Name | Attribute Type                | Attribute Description                                                                                  |
|----------------|-------------------------------|--------------------------------------------------------------------------------------------------------|
| bearing†       | <a href="#">Angle</a>         | The relative bearing of the ownship vessel from the contact.                                           |
| contactID      | <a href="#">NumericGUID</a>   | An identifier of the contact.                                                                          |
| CPA†           | <a href="#">GeoPosition2D</a> | An estimated point in which the distance between the vehicle and contact will reach the minimum value. |
| CPATime†       | <a href="#">DateTime</a>      | Time of contact CPA.                                                                                   |

### 6.1.103 RenderUselessControl

The purpose of this service is to provide a mechanism to destroy, disable, or make the system and/or subsystems of the vehicle less valuable if the vehicle were to be captured by an adversary. Depending on the implementation, some or all operations in this service may not be sent successfully.

**Table 332:** RenderUselessControl Operations

| Service Requests (Inputs)                    | Service Responses (Outputs)                              |
|----------------------------------------------|----------------------------------------------------------|
| <a href="#">setRenderUseless</a>             | <a href="#">reportRenderUselessCommandStatus</a>         |
| <a href="#">cancelRenderUselessCommand</a> ⊕ | <a href="#">reportRenderUselessCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.103.1 reportRenderUselessCommandStatus

**Description:** This operation is used to report the status of the render-useless command.

**Namespace:** UMAA::SO::RenderUselessControl

**Topic:** RenderUselessCommandStatus

**Data Type:** RenderUselessCommandStatusType

**Table 333:** RenderUselessCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.103.2 setRenderUseless

**Description:** This operation is used to render the target system or subsystem inoperable.

**Namespace:** UMAA::SO::RenderUselessControl

**Topic:** RenderUselessCommand

**Data Type:** RenderUselessCommandType

**Table 334:** RenderUselessCommandType Message Definition

| Attribute Name                                                    | Attribute Type | Attribute Description |
|-------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                |                       |

#### 6.1.104 RenderUselessStatus

The purpose of this service is to provide a mechanism to report whether the system and/or subsystems of the vehicle have been intentionally rendered useless.

**Table 335:** RenderUselessStatus Operations

| Service Requests (Inputs)            | Service Responses (Outputs)         |
|--------------------------------------|-------------------------------------|
| <a href="#">queryRenderUseless</a> ⊕ | <a href="#">reportRenderUseless</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

##### 6.1.104.1 reportRenderUseless

**Description:** This operation is used to report if a target has been rendered inoperable.

**Namespace:** UMAA::SO::RenderUselessStatus

**Topic:** RenderUselessReport

**Data Type:** RenderUselessReportType

**Table 336:** RenderUselessReportType Message Definition

| Attribute Name                                                   | Attribute Type                             | Attribute Description                                                                                                                                  |
|------------------------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAAStatus</a> |                                            |                                                                                                                                                        |
| errorString                                                      | <a href="#">StringShortDescription</a>     | Description associated with failed render-useless target system or subsystem. No description will be filled if the state is Normal or RenderedUseless. |
| state                                                            | <a href="#">RenderUselessStateEnumType</a> | A render-useless state of the target system or subsystem.                                                                                              |

#### 6.1.105 ResourceIdentification

The purpose of this service is to report the information of the vehicle and its subsystems.

**Table 337:** ResourceIdentification Operations

| Service Requests (Inputs)                    | Service Responses (Outputs)                 |
|----------------------------------------------|---------------------------------------------|
| <a href="#">queryResourceAuthorization</a> ⊕ | <a href="#">reportResourceAuthorization</a> |
| <a href="#">querySubsystemID</a> ⊕           | <a href="#">reportSubsystemID</a>           |
| <a href="#">queryVehicleID</a> ⊕             | <a href="#">reportVehicleID</a>             |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.105.1 [reportResourceAuthorization](#)

**Description:** This operation is used to report a list of levels of authorization of the system or subsystem(s).

**Namespace:** UMAA::MM::ResourceIdentification

**Topic:** ResourceAuthorizationReport

**Data Type:** ResourceAuthorizationReportType

**Table 338:** ResourceAuthorizationReportType Message Definition

| Attribute Name                                                    | Attribute Type                      | Attribute Description                  |
|-------------------------------------------------------------------|-------------------------------------|----------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                     |                                        |
| authorizationLevel*                                               | <a href="#">SpecificLOIEnumType</a> | A list of authorized control stations. |

#### 6.1.105.2 [reportSubsystemID](#)

**Description:** This operation is used to report the information of the subsystem(s) on-board or off-board a vehicle.

**Namespace:** UMAA::MM::ResourceIdentification

**Topic:** SubsystemIDReport

**Data Type:** SubsystemIDReportType

**Table 339:** SubsystemIDReportType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                                                                            |
|-------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                        |                                                                                                  |
| isControlTransferCapable                                          | <a href="#">boolean</a>                | An subsystem or a subset of a system can be transferred control between control systems.         |
| name                                                              | <a href="#">StringShortDescription</a> | A name to describe a payload or a subsystem.                                                     |
| type                                                              | <a href="#">StringShortDescription</a> | A name to describe the type of payload or subsystem (e.g. cameras, sonar, batteries, GPS, etc.). |

### 6.1.105.3 reportVehicleID

**Description:** This operation is used to report the information of a vehicle or a system.

**Namespace:** UMAA::MM::ResourceIdentification

**Topic:** VehicleIDReport

**Data Type:** VehicleIDReportType

**Table 340:** VehicleIDReportType Message Definition

| Attribute Name                                                  | Attribute Type                         | Attribute Description                                                                                                                                                                    |
|-----------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                        |                                                                                                                                                                                          |
| domain                                                          | <a href="#">DomainEnumType</a>         | The domain that the vehicle is operated under.                                                                                                                                           |
| isControlTransferCapable                                        | <a href="#">boolean</a>                | a vehicle or a system can be transferred control between control systems.                                                                                                                |
| make                                                            | <a href="#">StringShortDescription</a> | The manufacture of the vehicle.                                                                                                                                                          |
| model                                                           | <a href="#">StringShortDescription</a> | The model of the vehicle.                                                                                                                                                                |
| name                                                            | <a href="#">StringShortDescription</a> | The name of the vehicle or a system.                                                                                                                                                     |
| protocol                                                        | <a href="#">StringShortDescription</a> | The protocol used to communicate to the vehicle.                                                                                                                                         |
| type                                                            | <a href="#">StringShortDescription</a> | The type of the vehicle or a system.                                                                                                                                                     |
| vehicleNumber                                                   | <a href="#">NumericGUID</a>            | A unique number which specifies the string designation for the vehicle. It's a tail number for air vehicle, hull number for maritime vehicle, or registration number for ground vehicle. |

### 6.1.106 SelfCollisionAvoidanceConfig

The purpose of this service is to provide a mechanism to configure avoidance behaviors on the vehicle.

**Table 341:** SelfCollisionAvoidanceConfig Operations

| Service Requests (Inputs)                           | Service Responses (Outputs)                        |
|-----------------------------------------------------|----------------------------------------------------|
| <a href="#">querySelfCollisionAvoidanceConfig</a> ⊕ | <a href="#">reportSelfCollisionAvoidanceConfig</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.106.1 reportSelfCollisionAvoidanceConfig

**Description:** This operation is used to report the current configuration of the self-collision avoidance of the vehicle.

**Namespace:** UMAA::MO::SelfCollisionAvoidanceConfig

**Topic:** SelfCollisionAvoidanceConfigReport

**Data Type:** SelfCollisionAvoidanceConfigReportType

**Table 342:** SelfCollisionAvoidanceConfigReportType Message Definition

| Attribute Name                                                    | Attribute Type                              | Attribute Description                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                             |                                                                                                                                                                                                                                                                                                                                                                                    |
| priority                                                          | <a href="#">Priority</a>                    | The relative priority used to establish precedence when multiple moving objects support self-collision avoidance. Lower values should yield to objects with higher values. Fixed objects, or moving objects that do not support self-collision avoidance, are considered to have maximum priority (255). If two objects have the same priority, the behavior is non-deterministic. |
| state                                                             | <a href="#">CollisionAvoidStateEnumType</a> | An currently configured behavior for self-collision avoidance.                                                                                                                                                                                                                                                                                                                     |

#### 6.1.107 SelfCollisionAvoidanceControl

The purpose of this service is to provide a mechanism to control supported self-collision avoidance capabilities on the vehicle.

**Table 343:** SelfCollisionAvoidanceControl Operations

| Service Requests (Inputs)                               | Service Responses (Outputs)                                       |
|---------------------------------------------------------|-------------------------------------------------------------------|
| <a href="#">setSelfCollisionAvoidance</a>               | <a href="#">reportSelfCollisionAvoidanceCommandStatus</a>         |
| <a href="#">querySelfCollisionAvoidanceCommandAck</a> ⊕ | <a href="#">reportSelfCollisionAvoidanceCommandAck</a>            |
| <a href="#">cancelSelfCollisionAvoidanceCommand</a> ⊕   | <a href="#">reportSelfCollisionAvoidanceCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

##### 6.1.107.1 reportSelfCollisionAvoidanceCommandAck

**Description:** This operation is used to report the current self-collision avoidance command.

**Namespace:** UMAA::MO::SelfCollisionAvoidanceControl

**Topic:** SelfCollisionAvoidanceCommandAckReport

**Data Type:** SelfCollisionAvoidanceCommandAckReportType

**Table 344:** SelfCollisionAvoidanceCommandAckReportType Message Definition

| Attribute Name                                                               | Attribute Type                                    | Attribute Description |
|------------------------------------------------------------------------------|---------------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACCommandStatusBase</a> |                                                   |                       |
| command                                                                      | <a href="#">SelfCollisionAvoidanceCommandType</a> | The source command.   |

**6.1.107.2 reportSelfCollisionAvoidanceCommandStatus**

**Description:** This operation is used to report a response whether the vehicle supports the self-collision avoidance.

**Namespace:** UMAA::MO::SelfCollisionAvoidanceControl

**Topic:** SelfCollisionAvoidanceCommandStatus

**Data Type:** SelfCollisionAvoidanceCommandStatusType

**Table 345:** SelfCollisionAvoidanceCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

**6.1.107.3 setSelfCollisionAvoidance**

**Description:** This operation is used to set the active behavior for self-collision avoidance of the vehicle.

**Namespace:** UMAA::MO::SelfCollisionAvoidanceControl

**Topic:** SelfCollisionAvoidanceCommand

**Data Type:** SelfCollisionAvoidanceCommandType

**Table 346:** SelfCollisionAvoidanceCommandType Message Definition

| Attribute Name                                                    | Attribute Type                              | Attribute Description                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                             |                                                                                                                                                                                                                                                                                                                                                                                    |
| priority                                                          | <a href="#">Priority</a>                    | The relative priority used to establish precedence when multiple moving objects support self-collision avoidance. Lower values should yield to objects with higher values. Fixed objects, or moving objects that do not support self-collision avoidance, are considered to have maximum priority (255). If two objects have the same priority, the behavior is non-deterministic. |
| state                                                             | <a href="#">CollisionAvoidStateEnumType</a> | An active behavior for self-collision avoidance.                                                                                                                                                                                                                                                                                                                                   |

**6.1.108 SelfCollisionAvoidanceSpecs**

The purpose of this service is to provide a mechanism to determine supported self-collision avoidance specifications on the vehicle.

**Table 347:** SelfCollisionAvoidanceSpecs Operations

| Service Requests (Inputs)                          | Service Responses (Outputs)                       |
|----------------------------------------------------|---------------------------------------------------|
| <a href="#">querySelfCollisionAvoidanceSpecs</a> ⊕ | <a href="#">reportSelfCollisionAvoidanceSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.108.1 [reportSelfCollisionAvoidanceSpecs](#)

**Description:** This operation is used to report the capabilities of the self-collision avoidance of the vehicle.

**Namespace:** UMAA::MO::SelfCollisionAvoidanceSpecs

**Topic:** SelfCollisionAvoidanceSpecsReport

**Data Type:** SelfCollisionAvoidanceSpecsReportType

**Table 348:** SelfCollisionAvoidanceSpecsReportType Message Definition

| Attribute Name                                                  | Attribute Type          | Attribute Description                                        |
|-----------------------------------------------------------------|-------------------------|--------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                         |                                                              |
| avoidObstacle                                                   | <a href="#">boolean</a> | One (1) means the vehicle support avoid-obstacle behavior.   |
| stopOnObstacle                                                  | <a href="#">boolean</a> | One (1) means the vehicle support stop-on-obstacle behavior. |

#### 6.1.109 [SelfCollisionAvoidanceStatus](#)

The purpose of this service is to provide a mechanism to solicit status information on the vehicle.

**Table 349:** SelfCollisionAvoidanceStatus Operations

| Service Requests (Inputs)                     | Service Responses (Outputs)                  |
|-----------------------------------------------|----------------------------------------------|
| <a href="#">querySelfCollisionAvoidance</a> ⊕ | <a href="#">reportSelfCollisionAvoidance</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.109.1 [reportSelfCollisionAvoidance](#)

**Description:** This operation is used to report the current status of the self-collision avoidance of the vehicle.

**Namespace:** UMAA::MO::SelfCollisionAvoidanceStatus

**Topic:** SelfCollisionAvoidanceReport

**Data Type:** SelfCollisionAvoidanceReportType

**Table 350:** SelfCollisionAvoidanceReportType Message Definition

| Attribute Name                                                    | Attribute Type                               | Attribute Description                             |
|-------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                              |                                                   |
| status                                                            | <a href="#">CollisionAvoidStatusEnumType</a> | A current status of the self-collision avoidance. |

**6.1.110 SoftwareVersionStatus**

The purpose of this service is to provide a mechanism to report the software versions of the system or its subsystem.

**Table 351:** SoftwareVersionStatus Operations

| Service Requests (Inputs)              | Service Responses (Outputs)           |
|----------------------------------------|---------------------------------------|
| <a href="#">querySoftwareVersion</a> ⊕ | <a href="#">reportSoftwareVersion</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

**6.1.110.1 reportSoftwareVersion**

**Description:** This operation is used to report the software version of a specified system or the subsystem.

**Namespace:** [UMAA::SO::SoftwareVersionStatus](#)

**Topic:** [SoftwareVersionReport](#)

**Data Type:** [SoftwareVersionReportType](#)

**Table 352:** SoftwareVersionReportType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                                                                |
|-------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                        |                                                                                      |
| buildID                                                           | <a href="#">StringShortDescription</a> | The build ID of this software unit.                                                  |
| copyright                                                         | <a href="#">StringShortDescription</a> | The copy write info for this software unit.                                          |
| name                                                              | <a href="#">NumericGUID</a>            | The name of this software unit.                                                      |
| softwareDescription                                               | <a href="#">StringShortDescription</a> | A description of this software unit.                                                 |
| version                                                           | <a href="#">StringShortDescription</a> | The version of this software unit.                                                   |
| softwareID*                                                       | <a href="#">NumericGUID</a>            | The ID of this software unit (could be an executable, script, shared library, etc.). |

**6.1.111 StationkeepControl**

The purpose of this service is to maintain position relative to a contact.

**Table 353:** StationkeepControl Operations

| Service Requests (Inputs)                | Service Responses (Outputs)                   |
|------------------------------------------|-----------------------------------------------|
| setStationkeep                           | reportStationkeepCommandStatus                |
| queryStationkeepCommandAck $\oplus$      | reportStationkeepCommandAck                   |
| queryStationkeepExecutionStatus $\oplus$ | reportStationkeepExecutionStatus              |
| cancelStationkeepCommand $\oplus$        | reportStationkeepCancelCommandStatus $\oplus$ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

#### 6.1.111.1 reportStationkeepCommandAck

**Description:** This operation is used to provide the Stationkeep commanded values.

**Namespace:** UMAA::MO::StationkeepControl

**Topic:** StationkeepCommandAckReport

**Data Type:** StationkeepCommandAckReportType

**Table 354:** StationkeepCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                         | Attribute Description |
|-----------------------------------------------------------------------------|----------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                        |                       |
| command                                                                     | <a href="#">StationkeepCommandType</a> | The source command.   |

#### 6.1.111.2 reportStationkeepCommandStatus

**Description:** This operation is used to report the current status of the Stationkeep command.

**Namespace:** UMAA::MO::StationkeepControl

**Topic:** StationkeepCommandStatus

**Data Type:** StationkeepCommandStatusType

**Table 355:** StationkeepCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.111.3 reportStationkeepExecutionStatus

**Description:** This operation is used to report the current Stationkeep status.

**Namespace:** UMAA::MO::StationkeepControl

**Topic:** StationkeepExecutionStatusReport

**Data Type:** StationkeepExecutionStatusReportType

**Table 356:** StationkeepExecutionStatusReportType Message Definition

| Attribute Name                                                              | Attribute Type                       | Attribute Description                                                                                            |
|-----------------------------------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                      |                                                                                                                  |
| closingSpeed                                                                | <a href="#">GroundSpeed</a>          | Defines current closingSpeed to contact.                                                                         |
| contactLost                                                                 | <a href="#">boolean</a>              | Indicates whether a contact has been lost when transiting to the waypoint.                                       |
| contactTrackID                                                              | <a href="#">NumericGUID</a>          | Defines current contactTrackID.                                                                                  |
| range                                                                       | <a href="#">Distance</a>             | Defines current distance to contact.                                                                             |
| rangeTolerance                                                              | <a href="#">Distance</a>             | Defines the amount of distance error allowed relative to the commanded distance to contact for station keeping.  |
| stationkeepState                                                            | <a href="#">StationkeepStateType</a> | Defines the state of the station keeping.                                                                        |
| timeStationkeepCompleted†                                                   | <a href="#">DateTime</a>             | The absolute time at which the station keep is estimated to be completed (optional in case duration is forever). |
| timeStationskeepAchieved                                                    | <a href="#">DateTime</a>             | The absolute time at which station keep is estimated to be achieved or was actually first achieved.              |

#### 6.1.111.4 setStationkeep

**Description:** This operation is used to set the current Stationkeep command.

**Namespace:** UMAA::MO::StationkeepControl

**Topic:** StationkeepCommand

**Data Type:** StationkeepCommandType

**Table 357:** StationkeepCommandType Message Definition

| Attribute Name                                                    | Attribute Type                       | Attribute Description                                                                                                                                          |
|-------------------------------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                      |                                                                                                                                                                |
| angleType                                                         | <a href="#">BearingAngleEnumType</a> | Defines angle reference frame.                                                                                                                                 |
| bearing                                                           | <a href="#">AngleRequirement</a>     | Defines bearing to contact for station keeping.                                                                                                                |
| closingSpeed                                                      | <a href="#">GroundSpeed</a>          | Defines closingSpeed to contact for station keeping.                                                                                                           |
| contactTrackID                                                    | <a href="#">NumericGUID</a>          | Defines contactTrackID for station keeping.                                                                                                                    |
| endTime†                                                          | <a href="#">DateTimeRequirement</a>  | Specifies the end of the command execution time period for the station keep operation; if not specified runs indefinitely until command is changed externally. |

| Attribute Name | Attribute Type                      | Attribute Description                            |
|----------------|-------------------------------------|--------------------------------------------------|
| range          | <a href="#">DistanceRequirement</a> | Defines distance to contact for station keeping. |
| transitSpeed   | <a href="#">SpeedControlType</a>    | The desired travel speed of the vehicle.         |

### 6.1.112 StillImageConfig

The purpose of this service is to provide access to the configuration of a camera, allowing the controlling component to set the camera to a particular operational profile.

**Table 358:** StillImageConfig Operations

| Service Requests (Inputs)               | Service Responses (Outputs)            |
|-----------------------------------------|----------------------------------------|
| <a href="#">queryStillImageConfig</a> ⊕ | <a href="#">reportStillImageConfig</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.112.1 reportStillImageConfig

**Description:** This operation is used to report the configuration of the still image.

**Namespace:** UMAA::SA::StillImageConfig

**Topic:** StillImageConfigReport

**Data Type:** StillImageConfigReportType

**Table 359:** StillImageConfigReportType Message Definition

| Attribute Name                                                  | Attribute Type                      | Attribute Description                                  |
|-----------------------------------------------------------------|-------------------------------------|--------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                     |                                                        |
| frameSize                                                       | <a href="#">FrameSizeEnumType</a>   | Current frame size configuration of the still image.   |
| stillImageError                                                 | <a href="#">StillImageErrorType</a> | Still image error codes and descriptions.              |
| supportedImageFormat                                            | <a href="#">ImageFormatEnumType</a> | Current image format configuration of the still image. |

### 6.1.113 StillImageSpecs

The purpose of this service is to provide access to the camera capabilities.

**Table 360:** StillImageSpecs Operations

| Service Requests (Inputs)              | Service Responses (Outputs)           |
|----------------------------------------|---------------------------------------|
| <a href="#">queryStillImageSpecs</a> ⊕ | <a href="#">reportStillImageSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a  $\oplus$ .

### 6.1.113.1 reportStillImageSpecs

**Description:** This operation is used to report the capabilities of a still image.

**Namespace:** UMAA::SA::StillImageSpecs

**Topic:** StillImageSpecsReport

**Data Type:** StillImageSpecsReportType

**Table 361:** StillImageSpecsReportType Message Definition

| Attribute Name                                                  | Attribute Type          | Attribute Description                   |
|-----------------------------------------------------------------|-------------------------|-----------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                         |                                         |
| supportedBMP                                                    | <a href="#">boolean</a> | The unsupported/supported image format. |
| supportedCGA320x200                                             | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedCIF1408x1152                                           | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedCIF352x288                                             | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedCIF704x576                                             | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedCR2                                                    | <a href="#">boolean</a> | The unsupported/supported image format. |
| supportedDNG                                                    | <a href="#">boolean</a> | The unsupported/supported image format. |
| supportedEGA640x350                                             | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedGIF                                                    | <a href="#">boolean</a> | The unsupported/supported image format. |
| supportedHD10801920x1080                                        | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedHD480852x480                                           | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedHD7201280x720                                          | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedHSXGA5120x4096                                         | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedJPEG                                                   | <a href="#">boolean</a> | The unsupported/supported image format. |
| supportedNEF                                                    | <a href="#">boolean</a> | The unsupported/supported image format. |
| supportedPGM                                                    | <a href="#">boolean</a> | The unsupported/supported image format. |
| supportedPNG                                                    | <a href="#">boolean</a> | The unsupported/supported image format. |
| supportedPNM                                                    | <a href="#">boolean</a> | The unsupported/supported image format. |
| supportedPPM                                                    | <a href="#">boolean</a> | The unsupported/supported image format. |
| supportedQCIF176x144                                            | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedQQVGA160x120                                           | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedQSXGA2560x2048                                         | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedQVGA320x240                                            | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedQXGA2048x1536                                          | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedSQCIF128x96                                            | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedSVGA800x600                                            | <a href="#">boolean</a> | The unsupported/supported frame size.   |
| supportedSXGA1280x1024                                          | <a href="#">boolean</a> | The unsupported/supported frame size.   |

| Attribute Name           | Attribute Type | Attribute Description                   |
|--------------------------|----------------|-----------------------------------------|
| supportedTIFF            | boolean        | The unsupported/supported image format. |
| supportedUXGA1600x1200   | boolean        | The unsupported/supported frame size.   |
| supportedVGA640x480      | boolean        | The unsupported/supported frame size.   |
| supportedWHSXGA6400x4096 | boolean        | The unsupported/supported frame size.   |
| supportedWHUXGA7680x4800 | boolean        | The unsupported/supported frame size.   |
| supportedWOXGA2560x1600  | boolean        | The unsupported/supported frame size.   |
| supportedWQSXGA3200x2048 | boolean        | The unsupported/supported frame size.   |
| supportedWQUXGA3840x2400 | boolean        | The unsupported/supported frame size.   |
| supportedWSXGA1600x1024  | boolean        | The unsupported/supported frame size.   |
| supportedWUXGA1920x1200  | boolean        | The unsupported/supported frame size.   |
| supportedWVGA852x480     | boolean        | The unsupported/supported frame size.   |
| supportedWXGA1366x768    | boolean        | The unsupported/supported frame size.   |
| supportedXGA1024x768     | boolean        | The unsupported/supported frame size.   |

#### 6.1.114 StillImageStatus

The purpose of this service is to provide a means to obtain images from the camera. While this service reports each image individually, the Events service can be used to automatically report images at a specified rate thereby simulating video (typically done to create an MJPEG video stream).

**Table 362:** StillImageStatus Operations

| Service Requests (Inputs)         | Service Responses (Outputs)      |
|-----------------------------------|----------------------------------|
| <a href="#">queryStillImage</a> ⊕ | <a href="#">reportStillImage</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

##### 6.1.114.1 reportStillImage

**Description:** This operation is used to report the current status still image.

**Namespace:** UMAA::SA::StillImageStatus

**Topic:** StillImageReport

**Data Type:** StillImageReportType

**Table 363:** StillImageReportType Message Definition

| Attribute Name                                                  | Attribute Type                            | Attribute Description                    |
|-----------------------------------------------------------------|-------------------------------------------|------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                           |                                          |
| coordinateSystem                                                | <a href="#">boolean</a>                   | Reference coordinate system for image.   |
| imageFrame                                                      | <a href="#">ImageFormatEnumType</a>       | Current image format of the still image. |
| URI                                                             | <a href="#">UniformResourceIdentifier</a> | The current location of the still image. |

**6.1.115 TamperDetectionControl**

The purpose of this service is to provide a mechanism to enable or disable tamper detection.

**Table 364:** TamperDetectionControl Operations

| Service Requests (Inputs)                        | Service Responses (Outputs)                                |
|--------------------------------------------------|------------------------------------------------------------|
| <a href="#">setTamperDetection</a>               | <a href="#">reportTamperDetectionCommandStatus</a>         |
| <a href="#">queryTamperDetectionCommandAck</a> ⊕ | <a href="#">reportTamperDetectionCommandAck</a>            |
| <a href="#">cancelTamperDetectionCommand</a> ⊕   | <a href="#">reportTamperDetectionCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

**6.1.115.1 reportTamperDetectionCommandAck**

**Description:** This operation is used to provide the TamperDetection commanded values.

**Namespace:** [UMAA::SO::TamperDetectionControl](#)

**Topic:** [TamperDetectionCommandAckReport](#)

**Data Type:** [TamperDetectionCommandAckReportType](#)

**Table 365:** TamperDetectionCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                             | Attribute Description |
|-----------------------------------------------------------------------------|--------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                            |                       |
| command                                                                     | <a href="#">TamperDetectionCommandType</a> | The source command.   |

**6.1.115.2 reportTamperDetectionCommandStatus**

**Description:** This operation is used to report the status of the tamper detection command.

**Namespace:** [UMAA::SO::TamperDetectionControl](#)

**Topic:** [TamperDetectionCommandStatus](#)

**Data Type:** TamperDetectionCommandStatusType

**Table 366:** TamperDetectionCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

### 6.1.115.3 setTamperDetection

**Description:** This operation is used to enable or disable tamper detection and to clear the previously reported activities.

**Namespace:** UMAA::SO::TamperDetectionControl

**Topic:** TamperDetectionCommand

**Data Type:** TamperDetectionCommandType

**Table 367:** TamperDetectionCommandType Message Definition

| Attribute Name                                                    | Attribute Type                                   | Attribute Description                |
|-------------------------------------------------------------------|--------------------------------------------------|--------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                                  |                                      |
| state                                                             | <a href="#">TamperDetectionStateEnum</a><br>Type | A desired state of tamper detection. |

### 6.1.116 TamperDetectionStatus

The purpose of this service is to provide a mechanism to report when tampering has occurred.

**Table 368:** TamperDetectionStatus Operations

| Service Requests (Inputs)              | Service Responses (Outputs)           |
|----------------------------------------|---------------------------------------|
| <a href="#">queryTamperDetection</a> ⊕ | <a href="#">reportTamperDetection</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.116.1 reportTamperDetection

**Description:** This operation is used to report the current status of anti-tamper detection. Detected activities are continuously reported until cleared by a setTamperDetectionState message.

**Namespace:** UMAA::SO::TamperDetectionStatus

**Topic:** TamperDetectionReport

**Data Type:** TamperDetectionReportType

**Table 369:** TamperDetectionReportType Message Definition

| Attribute Name                                                    | Attribute Type                                    | Attribute Description                          |
|-------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                                   |                                                |
| descriptor                                                        | <a href="#">StringShortDescription</a>            | Description of tamper detection activities.    |
| electricalTamper                                                  | <a href="#">boolean</a>                           | Current result of electrical tamper detection. |
| hardwareTamper                                                    | <a href="#">boolean</a>                           | Current result of hardware tamper detection.   |
| networkIntrusion                                                  | <a href="#">boolean</a>                           | Current result of network tamper detection.    |
| otherTamper                                                       | <a href="#">boolean</a>                           | Current result of tamper detection.            |
| state                                                             | <a href="#">TamperDetectionStateEnum<br/>Type</a> | The current state of tamper detection.         |

### 6.1.117 VehicleOrientationControl

The purpose of this service is to control the desired orientation of the vehicle. This service allows for low level control of vehicle orientation relative to the North-East-Down coordinate system.

**Table 370:** VehicleOrientationControl Operations

| Service Requests (Inputs)                                | Service Responses (Outputs)                                   |
|----------------------------------------------------------|---------------------------------------------------------------|
| <a href="#">setVehicleOrientation</a>                    | <a href="#">reportVehicleOrientationCommandStatus</a>         |
| <a href="#">queryVehicleOrientationCommandAck</a> ⊕      | <a href="#">reportVehicleOrientationCommandAck</a>            |
| <a href="#">queryVehicleOrientationExecutionStatus</a> ⊕ | <a href="#">reportVehicleOrientationExecutionStatus</a>       |
| <a href="#">cancelVehicleOrientationCommand</a> ⊕        | <a href="#">reportVehicleOrientationCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.117.1 reportVehicleOrientationCommandAck

**Description:** This operation is used to report the commanded value of the orientation to the vehicle.

**Namespace:** [UMAA::MO::VehicleOrientationControl](#)

**Topic:** [VehicleOrientationCommandAckReport](#)

**Data Type:** [VehicleOrientationCommandAckReportType](#)

**Table 371:** VehicleOrientationCommandAckReportType Message Definition

| Attribute Name                                                               | Attribute Type | Attribute Description |
|------------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACCommandStatusBase</a> |                |                       |

| Attribute Name | Attribute Type                                | Attribute Description |
|----------------|-----------------------------------------------|-----------------------|
| command        | <a href="#">VehicleOrientationCommandType</a> | The source command.   |

#### 6.1.117.2 reportVehicleOrientationCommandStatus

**Description:** This operation is used to report the status of the vehicle orientation command.

**Namespace:** UMAA::MO::VehicleOrientationControl

**Topic:** VehicleOrientationCommandStatus

**Data Type:** VehicleOrientationCommandStatusType

**Table 372:** VehicleOrientationCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.117.3 reportVehicleOrientationExecutionStatus

**Description:** This operation is used to report the current orientation control state of the vehicle.

**Namespace:** UMAA::MO::VehicleOrientationControl

**Topic:** VehicleOrientationExecutionStatusReport

**Data Type:** VehicleOrientationExecutionStatusReportType

**Table 373:** VehicleOrientationExecutionStatusReportType Message Definition

| Attribute Name                                                              | Attribute Type          | Attribute Description                             |
|-----------------------------------------------------------------------------|-------------------------|---------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                         |                                                   |
| attitudeAchieved                                                            | <a href="#">boolean</a> | The attitude is achieved and is being maintained. |

#### 6.1.117.4 setVehicleOrientation

**Description:** This operation is used to set the desired orientation of the vehicle. If the command attributes do not specify a determinate end of execution, the consumer must perform a "cancel" of the command to initiate the end of command execution.

**Namespace:** UMAA::MO::VehicleOrientationControl

**Topic:** VehicleOrientationCommand

**Data Type:** VehicleOrientationCommandType

**Table 374:** VehicleOrientationCommandType Message Definition

| Attribute Name                                                    | Attribute Type                              | Attribute Description                                                                                                           |
|-------------------------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                             |                                                                                                                                 |
| attitude                                                          | <a href="#">Orientation3DNEDRequirement</a> | The desired attitude.                                                                                                           |
| endTime†                                                          | <a href="#">DateTimeRequirement</a>         | Specifies the end of the command execution time period; if not specified runs indefinitely until command is changed externally. |
| headingReference†                                                 | <a href="#">HeadingReferenceEnumType</a>    | The desired heading reference.                                                                                                  |

#### 6.1.118 VehicleSituationalSignalStatus

The purpose of this service is to provide the current vehicle status with respect to situational signals (navigation lights and day shapes).

**Table 375:** VehicleSituationalSignalStatus Operations

| Service Requests (Inputs)                       | Service Responses (Outputs)                    |
|-------------------------------------------------|------------------------------------------------|
| <a href="#">queryVehicleSituationalSignal</a> ⊕ | <a href="#">reportVehicleSituationalSignal</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

##### 6.1.118.1 reportVehicleSituationalSignal

**Description:** This operation is used to report the current vehicle status with respect to situational signals (navigation lights and day shapes).

**Namespace:** UMAA::SA::VehicleSituationalSignalStatus

**Topic:** VehicleSituationalReport

**Data Type:** VehicleSituationalReportType

**Table 376:** VehicleSituationalReportType Message Definition

| Attribute Name                                                  | Attribute Type                                   | Attribute Description                                                                              |
|-----------------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                                  |                                                                                                    |
| currentSituation                                                | <a href="#">VehicleSituationalSignalEnumType</a> | The current vehicle status with respect to situational signals (navigation lights and day shapes). |

### 6.1.119 VideoIlluminatorConfig

The purpose of this service is to enable setting and reading the configuration of Illuminators associated with video sensors.

**Table 377:** VideoIlluminatorConfig Operations

| Service Requests (Inputs)                     | Service Responses (Outputs)                  |
|-----------------------------------------------|----------------------------------------------|
| <a href="#">queryVideoIlluminatorConfig</a> ⊕ | <a href="#">reportVideoIlluminatorConfig</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.119.1 reportVideoIlluminatorConfig

**Description:** This operation is used to report the configuration of a video illuminator.

**Namespace:** UMAA::SEM::VideoIlluminatorConfig

**Topic:** VideoIlluminatorConfigReport

**Data Type:** VideoIlluminatorConfigReportType

**Table 378:** VideoIlluminatorConfigReportType Message Definition

| Attribute Name                                                  | Attribute Type                                           | Attribute Description                                                                                            |
|-----------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                                          |                                                                                                                  |
| associatedSensorIDs                                             | sequence< <a href="#">NumericGUID</a> ><br>max size = 20 | List of video sensor IDs that are to be associated with this illuminator (this should be a sequence in the IDL). |
| mode                                                            | <a href="#">ImagingModeEnumType</a>                      | The illumination mode.                                                                                           |

### 6.1.120 VideoIlluminatorControl

The purpose of this service is to control Illuminators associated with video sensors. The service enables selection of an illumination mode, and setting the illumination intensity and the illuminator beam width for each illumination device.

**Table 379:** VideoIlluminatorControl Operations

| Service Requests (Inputs)                         | Service Responses (Outputs)                                 |
|---------------------------------------------------|-------------------------------------------------------------|
| <a href="#">setVideoIlluminator</a>               | <a href="#">reportVideoIlluminatorCommandStatus</a>         |
| <a href="#">queryVideoIlluminatorCommandAck</a> ⊕ | <a href="#">reportVideoIlluminatorCommandAck</a>            |
| <a href="#">cancelVideoIlluminatorCommand</a> ⊕   | <a href="#">reportVideoIlluminatorCancelCommandStatus</a> ⊕ |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.120.1 reportVideoIlluminatorCommandAck

**Description:** This operation is used to provide the VideoIlluminator commanded values.

**Namespace:** UMAA::SEM::VideoIlluminatorControl

**Topic:** VideoIlluminatorCommandAckReport

**Data Type:** VideoIlluminatorCommandAckReportType

**Table 380:** VideoIlluminatorCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                              | Attribute Description |
|-----------------------------------------------------------------------------|---------------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                             |                       |
| command                                                                     | <a href="#">VideoIlluminatorCommandType</a> | The source command.   |

#### 6.1.120.2 reportVideoIlluminatorCommandStatus

**Description:** This operation is used to report the status of a video illuminator command.

**Namespace:** UMAA::SEM::VideoIlluminatorControl

**Topic:** VideoIlluminatorCommandStatus

**Data Type:** VideoIlluminatorCommandStatusType

**Table 381:** VideoIlluminatorCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.120.3 setVideoIlluminator

**Description:** This operation is used to set the intensity and beam width of a video illuminator.

**Namespace:** UMAA::SEM::VideoIlluminatorControl

**Topic:** VideoIlluminatorCommand

**Data Type:** VideoIlluminatorCommandType

**Table 382:** VideoIlluminatorCommandType Message Definition

| Attribute Name                                                    | Attribute Type                            | Attribute Description                 |
|-------------------------------------------------------------------|-------------------------------------------|---------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                           |                                       |
| beamWidth                                                         | <a href="#">VideoIlluminatorBeamWidth</a> | The horizontal field of illumination. |

| Attribute Name | Attribute Type                                 | Attribute Description                |
|----------------|------------------------------------------------|--------------------------------------|
| level          | <a href="#">VideoIlluminatorIntensityLevel</a> | The intensity level as a percentage. |

### 6.1.121 VideoIlluminatorSpecs

The purpose of this service is to report the capabilities of Illuminators associated with video sensors.

**Table 383:** VideoIlluminatorSpecs Operations

| Service Requests (Inputs)                    | Service Responses (Outputs)                 |
|----------------------------------------------|---------------------------------------------|
| <a href="#">queryVideoIlluminatorSpecs</a> ⊕ | <a href="#">reportVideoIlluminatorSpecs</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.121.1 reportVideoIlluminatorSpecs

**Description:** This operation is used to report the capabilities of a video illuminator.

**Namespace:** UMAA::SEM::VideoIlluminatorSpecs

**Topic:** VideoIlluminatorSpecsReport

**Data Type:** VideoIlluminatorSpecsReportType

**Table 384:** VideoIlluminatorSpecsReportType Message Definition

| Attribute Name                                                    | Attribute Type                         | Attribute Description                         |
|-------------------------------------------------------------------|----------------------------------------|-----------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASStatus</a> |                                        |                                               |
| maxBeamWidth                                                      | <a href="#">boolean</a>                | The maximum horizontal field of illumination. |
| name                                                              | <a href="#">StringShortDescription</a> | The name of the video illuminator.            |
| supportedColor                                                    | <a href="#">boolean</a>                | The supported/unsupported illuminator mode.   |
| supportedGreyscale                                                | <a href="#">boolean</a>                | The supported/unsupported illuminator mode.   |
| supportedInfrared                                                 | <a href="#">boolean</a>                | The supported/unsupported illuminator mode.   |
| supportedLowlight                                                 | <a href="#">boolean</a>                | The supported/unsupported illuminator mode.   |

### 6.1.122 VideoIlluminatorStatus

The purpose of this service is to report the intensity and beam width of Illuminators associated with video sensors.

**Table 385:** VideoIlluminatorStatus Operations

| Service Requests (Inputs)               | Service Responses (Outputs)            |
|-----------------------------------------|----------------------------------------|
| <a href="#">queryVideoIlluminator</a> ⊕ | <a href="#">reportVideoIlluminator</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.122.1 [reportVideoIlluminator](#)

**Description:** This operation is used to report the intensity and beam width of a video illuminator.

**Namespace:** UMAA::SEM::VideoIlluminatorStatus

**Topic:** VideoIlluminatorReport

**Data Type:** VideoIlluminatorReportType

**Table 386:** VideoIlluminatorReportType Message Definition

| Attribute Name                                                  | Attribute Type                  | Attribute Description                 |
|-----------------------------------------------------------------|---------------------------------|---------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                 |                                       |
| beamWidth                                                       | <a href="#">AngleCapability</a> | The horizontal field of illumination. |
| level                                                           | <a href="#">CountCapability</a> | The intensity level as a percentage.  |

#### 6.1.123 [WaterCharacteristicsStatus](#)

The purpose of this service is to report the current characteristics of the water column around the vehicle.

**Table 387:** WaterCharacteristicsStatus Operations

| Service Requests (Inputs)                   | Service Responses (Outputs)                |
|---------------------------------------------|--------------------------------------------|
| <a href="#">queryWaterCharacteristics</a> ⊕ | <a href="#">reportWaterCharacteristics</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.123.1 [reportWaterCharacteristics](#)

**Description:** This operation is used to report the data parameters for the WaterCharacteristics service.

**Namespace:** UMAA::SA::WaterCharacteristicsStatus

**Topic:** WaterCharacteristicsReport

**Data Type:** WaterCharacteristicsReportType

**Table 388:** WaterCharacteristicsReportType Message Definition

| Attribute Name                                                  | Attribute Type               | Attribute Description                  |
|-----------------------------------------------------------------|------------------------------|----------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                              |                                        |
| conductivity†                                                   | <a href="#">Conductivity</a> | The measured or computed conductivity. |
| density†                                                        | <a href="#">Density</a>      | The measured density.                  |
| depth                                                           | <a href="#">DistanceBSL</a>  | The measured depth below sea level.    |
| salinity†                                                       | <a href="#">Salinity</a>     | The measured salinity.                 |
| soundVelocity†                                                  | <a href="#">Speed</a>        | The measured velocity of sound.        |
| temperature†                                                    | <a href="#">Temperature</a>  | The measured temperature.              |

**6.1.124 WeatherStatus**

The purpose of this service is to provide the current state of the weather.

**Table 389:** WeatherStatus Operations

| Service Requests (Inputs)      | Service Responses (Outputs)   |
|--------------------------------|-------------------------------|
| <a href="#">queryWeather</a> ⊕ | <a href="#">reportWeather</a> |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

**6.1.124.1 reportWeather**

**Description:** This operation is used to report the current status of the weather.

**Namespace:** [UMAA::SA::WeatherStatus](#)

**Topic:** WeatherReport

**Data Type:** WeatherReportType

**Table 390:** WeatherReportType Message Definition

| Attribute Name                                                  | Attribute Type                            | Attribute Description                                                |
|-----------------------------------------------------------------|-------------------------------------------|----------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                                           |                                                                      |
| airTemperature†                                                 | <a href="#">AirTemperature</a>            | The ambient air temperature.                                         |
| barometricPressure†                                             | <a href="#">WeatherBarometricPressure</a> | A measure of air pressure that correlates with weather and altitude. |
| cloudiness†                                                     | <a href="#">CloudCoverEnumType</a>        | The current state of cloud cover.                                    |
| dewPoint†                                                       | <a href="#">DewPointTemperature</a>       | The temperature at which water vapor condenses into water.           |
| icingSeverity†                                                  | <a href="#">WeatherSeverityEnumType</a>   | The extent of icing present.                                         |
| precipitation†                                                  | <a href="#">PrecipitationEnumType</a>     | The type of precipitation.                                           |
| relativeHumidity†                                               | <a href="#">Percent</a>                   | The amount of water vapor in the air.                                |

| Attribute Name         | Attribute Type   | Attribute Description                                              |
|------------------------|------------------|--------------------------------------------------------------------|
| thunderstormPotential† | Percent          | The current probability that there is a thunderstorm.              |
| visibility†            | Distance         | The distance at which an object or light can be clearly discerned. |
| waterTemperature†      | WaterTemperature | The water temperature at surface.                                  |

### 6.1.125 WhistleControl

The purpose of this service is to provide the whistle control and the current status of a specific whistle on the vehicle.

**Table 391:** WhistleControl Operations

| Service Requests (Inputs) | Service Responses (Outputs)       |
|---------------------------|-----------------------------------|
| setWhistle                | reportWhistleCommandStatus        |
| queryWhistleCommandAck⊕   | reportWhistleCommandAck           |
| cancelWhistleCommand⊕     | reportWhistleCancelCommandStatus⊕ |
| queryWhistle⊕             | reportWhistle                     |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.125.1 reportWhistle

**Description:** This operation is used to retrieve the current state of the whistle sounding device on the vehicle.

**Namespace:** UMAA::EO::WhistleControl

**Topic:** WhistleReport

**Data Type:** WhistleReportType

**Table 392:** WhistleReportType Message Definition

| Attribute Name                                                  | Attribute Type         | Attribute Description                                                                      |
|-----------------------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                        |                                                                                            |
| blastCondition†                                                 | BlastConditionEnumType | The blast state of the annunciator.                                                        |
| blastNumber†                                                    | PositiveCount          | The number of times blasted within the current set; includes current blast if in progress. |
| status                                                          | OnOffStatusEnumType    | The current on/off status of the whistle switch.                                           |

#### 6.1.125.2 reportWhistleCommandAck

**Description:** This operation is used to retrieve the current whistle sounding device command on the vehicle.

**Namespace:** UMAA::EO::WhistleControl

**Topic:** WhistleCommandAckReport

**Data Type:** WhistleCommandAckReportType

**Table 393:** WhistleCommandAckReportType Message Definition

| Attribute Name                                                              | Attribute Type                     | Attribute Description |
|-----------------------------------------------------------------------------|------------------------------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                    |                       |
| command                                                                     | <a href="#">WhistleCommandType</a> | The source command.   |

#### 6.1.125.3 reportWhistleCommandStatus

**Description:** This operation is used to retrieve the state of the whistle sounding device command on the vehicle.

**Namespace:** UMAA::EO::WhistleControl

**Topic:** WhistleCommandStatus

**Data Type:** WhistleCommandStatusType

**Table 394:** WhistleCommandStatusType Message Definition

| Attribute Name                                                          | Attribute Type | Attribute Description |
|-------------------------------------------------------------------------|----------------|-----------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatus</a> |                |                       |

#### 6.1.125.4 setWhistle

**Description:** This operation is used to control the whistle sounding device on the vehicle. If the command attributes do not specify a determinate end of execution, the consumer must perform a "cancel" of the command to initiate the end of command execution.

**Namespace:** UMAA::EO::WhistleControl

**Topic:** WhistleCommand

**Data Type:** WhistleCommandType

**Table 395:** WhistleCommandType Message Definition

| Attribute Name                                                    | Attribute Type                        | Attribute Description                                                                |
|-------------------------------------------------------------------|---------------------------------------|--------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommand</a> |                                       |                                                                                      |
| whistling†                                                        | <a href="#">WhistlePropertiesType</a> | Whistle properties. If the attribute is not provided, it means turn off the whistle. |

### 6.1.126 WindStatus

The purpose of this service is to provide the current wind state.

**Table 396:** WindStatus Operations

| Service Requests (Inputs)   | Service Responses (Outputs) |
|-----------------------------|-----------------------------|
| <a href="#">queryWind</a> ⊕ | <a href="#">reportWind</a>  |

See [Section 6.1](#) for an explanation of the inputs and outputs marked with a ⊕.

#### 6.1.126.1 reportWind

**Description:** This operation is used to report the wind state.

**Namespace:** UMAA::SA::WindStatus

**Topic:** WindReport

**Data Type:** WindReportType

**Table 397:** WindReportType Message Definition

| Attribute Name                                                  | Attribute Type                | Attribute Description                                                                                                                                                                                                                         |
|-----------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAASatus</a> |                               |                                                                                                                                                                                                                                               |
| relativeAverageDirection†                                       | <a href="#">RelativeAngle</a> | The average direction from which the wind blows, measured with respect to ship's centerline. The average is taken over some time window defined by the service provider.                                                                      |
| relativeAverageSpeed†                                           | <a href="#">Speed</a>         | The average magnitude of the relative wind. The average is taken over some time window defined by the service provider.                                                                                                                       |
| relativeInstantaneousDirection†                                 | <a href="#">RelativeAngle</a> | The instantaneous direction from which the wind blows, measured with respect to ship's centerline.                                                                                                                                            |
| relativeInstantaneousSpeed†                                     | <a href="#">Speed</a>         | The instantaneous magnitude of the relative wind.                                                                                                                                                                                             |
| relativeMaximumDirection†                                       | <a href="#">RelativeAngle</a> | The maximum direction from which the wind blows, measured with respect to ship's centerline. The maximum is taken over some time window defined by the service provider. See <a href="#">relativeMinimumDirection</a> for additional details. |
| relativeMaximumSpeed†                                           | <a href="#">Speed</a>         | The maximum magnitude of the relative wind. The maximum is taken over some time window defined by the service provider.                                                                                                                       |

| Attribute Name              | Attribute Type                           | Attribute Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| relativeMinimumDirection†   | <a href="#">RelativeAngle</a>            | The minimum direction from which the wind blows, measured with respect to ship's centerline. The minimum is taken over some time window defined by the service provider. The overall direction of the wind is contained between the relativeMinimumDirection and relativeMaximumDirection direction always traveling clockwise around the circle. Therefore if the relativeMinimumDirection value is greater than the relativeMaximumDirection value, it is assumed the angle crosses 0 degrees. |
| relativeMinimumSpeed†       | <a href="#">Speed</a>                    | The minimum magnitude of the relative wind. The minimum is taken over some time window defined by the service provider.                                                                                                                                                                                                                                                                                                                                                                          |
| straightDeckCrossSpeed†     | <a href="#">Speed</a>                    | The component of the wind normal to the ship. A negative value indicates a port crosswind and a positive value indicates a starboard crosswind.                                                                                                                                                                                                                                                                                                                                                  |
| straightDeckHeadSpeed†      | <a href="#">Speed</a>                    | The component of the wind that is parallel to the ship. A negative value indicates a tailwind and a positive value indicates a headwind.                                                                                                                                                                                                                                                                                                                                                         |
| trueAverageDirection†       | <a href="#">AzimuthTrueNorthPosAngle</a> | The average direction from which the wind blows, measured from true north. The average is taken over some time window defined by the service provider.                                                                                                                                                                                                                                                                                                                                           |
| trueAverageSpeed†           | <a href="#">GroundSpeed</a>              | The average magnitude of the true wind. The average is taken over some time window defined by the service provider.                                                                                                                                                                                                                                                                                                                                                                              |
| trueInstantaneousDirection† | <a href="#">AzimuthTrueNorthPosAngle</a> | The instantaneous direction from which the wind blows, measured from true north.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| trueInstantaneousSpeed†     | <a href="#">GroundSpeed</a>              | The instantaneous magnitude of the true wind.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| trueMaximumDirection†       | <a href="#">AzimuthTrueNorthPosAngle</a> | The maximum direction from which the wind blows, measured from true north. The maximum is taken over some time window defined by the service provider. See trueMinimumDirection for additional details.                                                                                                                                                                                                                                                                                          |
| trueMaximumSpeed†           | <a href="#">GroundSpeed</a>              | The maximum magnitude of the true wind. The maximum is taken over some time window defined by the service provider.                                                                                                                                                                                                                                                                                                                                                                              |
| trueMinimumDirection†       | <a href="#">AzimuthTrueNorthPosAngle</a> | The minimum direction from which the wind blows, measured from true north. The minimum is taken over some time window defined by the service provider. The overall direction of the wind is contained between the trueMinimumDirection and trueMaximumDirection direction always traveling clockwise around the circle. Therefore if the trueMinimumDirection value is greater than the trueMaximumDirection value, it is assumed the angle crosses 0 degrees.                                   |
| trueMinimumSpeed†           | <a href="#">GroundSpeed</a>              | The minimum magnitude of the true wind. The minimum is taken over some time window defined by the service provider.                                                                                                                                                                                                                                                                                                                                                                              |

## 6.2 Common Data Types

Common data types define DDS types that are referenced throughout the UMAA model. These DDS types are considered common because they can be re-used as the data type for many attributes defined in service interface topics, interface topics, and other common data types. These data types are not intended to be directly published to/subscribed as DDS topics.

### 6.2.1 UCSMDEInterfaceSet

**Namespace:** UMAA::UCSMDEInterfaceSet

**Description:** Defines the common UCSMDE Interface Set Message Fields.

**Table 398:** UCSMDEInterfaceSet Structure Definition

| Attribute Name | Attribute Type           | Attribute Description                |
|----------------|--------------------------|--------------------------------------|
| timeStamp      | <a href="#">DateTime</a> | The time at which the data is valid. |

### 6.2.2 UMAACCommand

**Namespace:** UMAA::UMAACommand

**Description:** Defines the common UMAA Command Message Fields.

**Table 399:** UMAACCommand Structure Definition

| Attribute Name                                                           | Attribute Type              | Attribute Description                                                     |
|--------------------------------------------------------------------------|-----------------------------|---------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UCSMDEInterfaceSet</a> |                             |                                                                           |
| source*                                                                  | <a href="#">NumericGUID</a> | The unique identifier of the originating source of the command interface. |
| destination*                                                             | <a href="#">NumericGUID</a> | The unique identifier of the destination of the command interface.        |
| sessionID*                                                               | <a href="#">NumericGUID</a> | The identifier of the session.                                            |

### 6.2.3 UMAAStatus

**Namespace:** UMAA::UMAAStatus

**Description:** Defines the common UMAA Status Message Fields.

**Table 400:** UMAAStatus Structure Definition

| Attribute Name                                                           | Attribute Type              | Attribute Description                                                    |
|--------------------------------------------------------------------------|-----------------------------|--------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UCSMDEInterfaceSet</a> |                             |                                                                          |
| source*                                                                  | <a href="#">NumericGUID</a> | The unique identifier of the originating source of the status interface. |

### 6.2.4 UMAACommandStatusBase

**Namespace:** UMAA::UMAACommandStatusBase

**Description:** Defines the common UMAA Command Status Base Message Fields.

**Table 401:** UMAACommandStatusBase Structure Definition

| Attribute Name                                                           | Attribute Type              | Attribute Description                                                            |
|--------------------------------------------------------------------------|-----------------------------|----------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UCSMDEInterfaceSet</a> |                             |                                                                                  |
| source*                                                                  | <a href="#">NumericGUID</a> | The unique identifier of the originating source of the command status interface. |
| sessionID*                                                               | <a href="#">NumericGUID</a> | The identifier of the session.                                                   |

### 6.2.5 UMAACommandStatus

**Namespace:** UMAA::UMAACommandStatus

**Description:** Defines the common UMAA Command Status Message Fields.

**Table 402:** UMAACommandStatus Structure Definition

| Attribute Name                                                              | Attribute Type                              | Attribute Description                                                                                                              |
|-----------------------------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Additional fields included from <a href="#">UMAA::UMAACommandStatusBase</a> |                                             |                                                                                                                                    |
| commandStatus                                                               | <a href="#">CommandStatusEnumType</a>       | The status of the command.                                                                                                         |
| commandStatusReason                                                         | <a href="#">CommandStatusReasonEnumType</a> | The reason for the status of the command.                                                                                          |
| logMessage                                                                  | <a href="#">StringLongDescription</a>       | Human-readable description related to response. Systems should not parse or use any information from this for processing purposes. |

### 6.2.6 DateTime

**Namespace:** UMAA::Measurement::DateTime

**Description:** Describes an absolute time. Conforms with POSIX time standard (IEEE Std 1003.1-2017) epoch reference point of January 1st, 1970 00:00:00 UTC.

**Table 403:** DateTime Structure Definition

| Attribute Name | Attribute Type                      | Attribute Description                                                                                                                |
|----------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| seconds        | <a href="#">DateTimeSeconds</a>     | The number of seconds offset from the standard POSIX (IEEE Std 1003.1-2017) epoch reference point of January 1st, 1970 00:00:00 UTC. |
| nanoseconds    | <a href="#">DateTimeNanoSeconds</a> | The number of nanoseconds elapsed within the current DateTimeSecond.                                                                 |

### 6.2.7 Acceleration3DPlatformXYZ

**Namespace:** UMAA::Common::Measurement::Acceleration3DPlatformXYZ

**Description:** Specifies the platform's rate of change of velocity with respect to time in the x, y, and z axes.

**Table 404:** Acceleration3DPlatformXYZ Structure Definition

| Attribute Name | Attribute Type                     | Attribute Description                                                                  |
|----------------|------------------------------------|----------------------------------------------------------------------------------------|
| xAccel         | <a href="#">AccelerationScalar</a> | Specifies the vehicle's rate of change of velocity with respect to time in the x-axis. |
| yAccel         | <a href="#">AccelerationScalar</a> | Specifies the vehicle's rate of change of velocity with respect to time in the y-axis. |
| zAccel         | <a href="#">AccelerationScalar</a> | Specifies the vehicle's rate of change of velocity with respect to time in the z-axis. |

### 6.2.8 AdvanceRatioEntryType

**Namespace:** UMAA::EO::AdvanceRatioStatus::AdvanceRatioEntryType

**Description:** The structure is used to describe the speed at a particular engine RPM.

**Table 405:** AdvanceRatioEntryType Structure Definition

| Attribute Name    | Attribute Type                         | Attribute Description                                                                                                                      |
|-------------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| engineRPM         | <a href="#">StringShortDescription</a> | The input engine RPM of the vehicle that maps to the speed values in this key/value pair.                                                  |
| speedThroughWater | <a href="#">StringShortDescription</a> | The resulting value for speed through water of the vehicle when the engine is operating at the provided engine RPM in this key/value pair. |

### 6.2.9 AirSpeedRequirement

**Namespace:** UMAA::Common::Speed::AirSpeedRequirement

**Description:** Defines the speed through air.

**Table 406:** AirSpeedRequirement Structure Definition

| Attribute Name | Attribute Type                    | Attribute Description                            |
|----------------|-----------------------------------|--------------------------------------------------|
| speed          | <a href="#">IndicatedAirspeed</a> | Specifies speed through air.                     |
| speedTolerance | <a href="#">AirSpeedTolerance</a> | Specifies the tolerance for a speed through air. |

### 6.2.10 AirSpeedTolerance

**Namespace:** UMAA::Common::Speed::AirSpeedTolerance

**Description:** Defines the speed through air tolerance.

**Table 407:** AirSpeedTolerance Structure Definition

| Attribute Name | Attribute Type                    | Attribute Description                                            |
|----------------|-----------------------------------|------------------------------------------------------------------|
| lowerlimit     | <a href="#">IndicatedAirspeed</a> | Specifies the lower limit of allowable values for the air speed. |
| upperlimit     | <a href="#">IndicatedAirspeed</a> | Specifies the upper limit of allowable values for the air speed. |

### 6.2.11 AlphaXPlatformType

**Namespace:** UMAA::Common::Orientation::AlphaXPlatformType

**Description:** A requirement that specifies an alpha angle relative to the Platform coordinate system.

**Table 408:** AlphaXPlatformType Structure Definition

| Attribute Name | Attribute Type            | Attribute Description                                              |
|----------------|---------------------------|--------------------------------------------------------------------|
| alpha          | <a href="#">RollAngle</a> | Defines an alpha angle relative to the Platform coordinate system. |

### 6.2.12 AltitudeAGLType

**Namespace:** UMAA::Common::Measurement::AltitudeAGLType

**Description:** The height above ground level.

**Table 409:** AltitudeAGLType Structure Definition

| Attribute Name | Attribute Type              | Attribute Description                      |
|----------------|-----------------------------|--------------------------------------------|
| altitudeAGL    | <a href="#">DistanceAGL</a> | Specifies the distance above ground level. |

### 6.2.13 AltitudeASFTType

**Namespace:** UMAA::Common::Measurement::AltitudeASFTType

**Description:** The height above sea floor.

**Table 410:** AltitudeASFTType Structure Definition

| Attribute Name | Attribute Type              | Attribute Description           |
|----------------|-----------------------------|---------------------------------|
| altitudeASF    | <a href="#">DistanceASF</a> | The height above the sea floor. |

### 6.2.14 AltitudeGeodeticType

**Namespace:** UMAA::Common::Measurement::AltitudeGeodeticType

**Description:** The geodetic height above the ellipsoid.

**Table 411:** AltitudeGeodeticType Structure Definition

| Attribute Name   | Attribute Type                   | Attribute Description                       |
|------------------|----------------------------------|---------------------------------------------|
| altitudeGeodetic | <a href="#">GeodeticAltitude</a> | The altitude above the reference ellipsoid. |

### 6.2.15 AltitudeMSLType

**Namespace:** UMAA::Common::Measurement::AltitudeMSLType

**Description:** The orthometric height above the Geoid (Mean Sea Level).

**Table 412:** AltitudeMSLType Structure Definition

| Attribute Name | Attribute Type              | Attribute Description                                    |
|----------------|-----------------------------|----------------------------------------------------------|
| altitudeMSL    | <a href="#">MSLAltitude</a> | The orthometric height above the Geoid (Mean Sea Level). |

### 6.2.16 AnalogSensorErrorType

**Namespace:** UMAA::SEM::SensorManagement::AnalogSensorErrorType

**Description:** This structure is used to report error code when the specified analog sensor configuration is set to be invalid.

**Table 413:** AnalogSensorErrorType Structure Definition

| Attribute Name | Attribute Type                                | Attribute Description                                                                   |
|----------------|-----------------------------------------------|-----------------------------------------------------------------------------------------|
| errorCode      | <a href="#">AnalogSensorErrorCodeEnumType</a> | Error code reports when the specified analog sensor configuration is set to be invalid. |
| errorMessage   | <a href="#">StringShortDescription</a>        | A description of the invalid analog sensor configuration setting.                       |

### 6.2.17 AngleCapability

**Namespace:** UMAA::Common::Capabilities::AngleCapability

**Description:** Realizes AngleCapabilityType: a ResourceCapability which specifies an angle capability.

**Table 414:** AngleCapability Structure Definition

| Attribute Name | Attribute Type                     | Attribute Description       |
|----------------|------------------------------------|-----------------------------|
| angle          | <a href="#">Angle</a>              | Describes the angle.        |
| angleDomain    | <a href="#">AngleSpecification</a> | Describes the angle domain. |

| Attribute Name | Attribute Type                   | Attribute Description          |
|----------------|----------------------------------|--------------------------------|
| angleSetPoint  | <a href="#">AngleRequirement</a> | Describes the angle set point. |

### 6.2.18 AngleRequirement

**Namespace:** UMAA::Common::Requirements::AngleRequirement

**Description:** Realizes AngleRequirementType: a Requirement that specifies the type of angle.

**Table 415:** AngleRequirement Structure Definition

| Attribute Name | Attribute Type                 | Attribute Description                   |
|----------------|--------------------------------|-----------------------------------------|
| angle          | <a href="#">Angle</a>          | Describes the required angle value.     |
| angleTolerance | <a href="#">AngleTolerance</a> | Describes the required angle tolerance. |

### 6.2.19 AngleSpecification

**Namespace:** UMAA::Common::Measurement::AngleSpecification

**Description:** Realizes AngleSpecType: an ObservableSpecification that specifies the range(s) of allowable values for an angle attribute.

**Table 416:** AngleSpecification Structure Definition

| Attribute Name | Attribute Type                    | Attribute Description                |
|----------------|-----------------------------------|--------------------------------------|
| lowerLimit     | sequence< <a href="#">Angle</a> > | Describes the lower limit of values. |
| upperLimit     | sequence< <a href="#">Angle</a> > | Describes the upper limit of values. |

### 6.2.20 AngleTolerance

**Namespace:** UMAA::Common::Measurement::AngleTolerance

**Description:** Realizes AngleToleranceType: an ObservableTolerance that specifies the range of allowable values for an angle attribute.

**Table 417:** AngleTolerance Structure Definition

| Attribute Name | Attribute Type        | Attribute Description                |
|----------------|-----------------------|--------------------------------------|
| lowerLimit     | <a href="#">Angle</a> | Describes the lower limit of values. |
| upperLimit     | <a href="#">Angle</a> | Describes the upper limit of values. |

### 6.2.21 BallastFillType

**Namespace:** UMAA::EO::BallastTank::BallastFillType

**Description: Union Type.** The desired fill amount of the ballast tank.

**Table 418:** BallastFillType Union(s)

| Type Name                       | Type Description                                                          |
|---------------------------------|---------------------------------------------------------------------------|
| <a href="#">BallastMassType</a> | The desired filled or empty level the ballast tank measured by mass.      |
| <a href="#">LevelType</a>       | Defines the desired percentage filled or empty level of the ballast tank. |

#### 6.2.22 BallastMassType

**Namespace:** UMAA::Common::Measurement::BallastMassType

**Description:** The desired filled or empty level the ballast tank measured by mass.

**Table 419:** BallastMassType Structure Definition

| Attribute Name | Attribute Type       | Attribute Description                                                          |
|----------------|----------------------|--------------------------------------------------------------------------------|
| mass           | <a href="#">Mass</a> | Specifies the desired filled or empty level the ballast tank measured by mass. |

#### 6.2.23 BallastPumpFlowRateType

**Namespace:** UMAA::EO::BallastTank::BallastPumpFlowRateType

**Description: Union Type.** The desired flow rate to fill or empty the ballast pump.

**Table 420:** BallastPumpFlowRateType Union(s)

| Type Name                                 | Type Description                                                            |
|-------------------------------------------|-----------------------------------------------------------------------------|
| <a href="#">MassBallastFlowRateType</a>   | The desired flow rate to fill or empty the ballast pump measured by mass.   |
| <a href="#">VolumeBallastFlowRateType</a> | The desired flow rate to fill or empty the ballast pump measured by volume. |

#### 6.2.24 BetaYPlatformType

**Namespace:** UMAA::Common::Orientation::BetaYPlatformType

**Description:** A requirement that specifies a beta angle relative to the Platform coordinate system.

**Table 421:** BetaYPlatformType Structure Definition

| Attribute Name | Attribute Type                 | Attribute Description                                            |
|----------------|--------------------------------|------------------------------------------------------------------|
| beta           | <a href="#">PitchHalfAngle</a> | Defines a beta angle relative to the Platform coordinate system. |

### 6.2.25 BlastPropertiesType

**Namespace:** UMAA::Common::Propulsion::BlastPropertiesType

**Description:** This structure is used to describe the properties of a signal blast.

**Table 422:** BlastPropertiesType Structure Definition

| Attribute Name | Attribute Type    | Attribute Description                                                                       |
|----------------|-------------------|---------------------------------------------------------------------------------------------|
| blastNumber    | PositiveCount     | The number of times commanded to blast, if attribute is not included then it is continuous. |
| restTime       | TimeBetweenBlasts | The time between blasts.                                                                    |

### 6.2.26 BoundingBoxType

**Namespace:** UMAA::Common::Environment::BoundingBoxType

**Description:** This is a base structure used to report the bounds of an image in pixel coordinates.

**Table 423:** BoundingBoxType Structure Definition

| Attribute Name | Attribute Type | Attribute Description                                           |
|----------------|----------------|-----------------------------------------------------------------|
| lowerRightx    | Order          | The x-coordinate of the lower-right pixel in pixel coordinates. |
| lowerRighty    | Order          | The y-coordinate of the lower-right pixel in pixel coordinates. |
| upperLeftx     | Order          | The x-coordinate of the upper-left pixel in pixel coordinates.  |
| upperLefty     | Order          | The y-coordinate of the upper-left pixel in pixel coordinates.  |

### 6.2.27 CommsRateMegabitsPerSecondCapability

**Namespace:** UMAA::Common::Capabilities::CommsRateMegabitsPerSecondCapability

**Description:** Realizes CommsRateCapabilityType: a ResourceCapability which specifies a communication rate capability.

**Table 424:** CommsRateMegabitsPerSecondCapability Structure Definition

| Attribute Name  | Attribute Type                          | Attribute Description               |
|-----------------|-----------------------------------------|-------------------------------------|
| commsRate       | CommsRateMegabitsPerSecond              | Describes the comms rate.           |
| commsRateDomain | CommsRateMegabitsPerSecondSpecification | Describes the comms rate domain.    |
| sizeSetPoint    | CommsRateMegabitsPerSecondRequirement   | Describes the comms size set point. |

### 6.2.28 CommsRateMegabitsPerSecondRequirement

**Namespace:** UMAA::Common::Requirements::CommsRateMegabitsPerSecondRequirement

**Description:** Realizes CommsRateRequirementType: CommunicationRateRequirementType is a Requirement that specifies the type of rate at which the information is transmitted.

**Table 425:** CommsRateMegabitsPerSecondRequirement Structure Definition

| Attribute Name     | Attribute Type                                      | Attribute Description               |
|--------------------|-----------------------------------------------------|-------------------------------------|
| commsRate          | <a href="#">CommsRateMegabitsPerSecond</a>          | Describes the comms rate.           |
| commsRateTolerance | <a href="#">CommsRateMegabitsPerSecondTolerance</a> | Describes the comms rate tolerance. |

### 6.2.29 CommsRateMegabitsPerSecondSpecification

**Namespace:** UMAA::Common::Measurement::CommsRateMegabitsPerSecondSpecification

**Description:** Realizes CommsRateSpecType: an ObservableSpecification that specifies the range(s) of allowable values for an commsRate attribute.

**Table 426:** CommsRateMegabitsPerSecondSpecification Structure Definition

| Attribute Name | Attribute Type                                             | Attribute Description                |
|----------------|------------------------------------------------------------|--------------------------------------|
| lowerLimit     | <a href="#">sequence&lt;CommsRateMegabitsPerSecond&gt;</a> | Describes the lower limit of values. |
| upperLimit     | <a href="#">sequence&lt;CommsRateMegabitsPerSecond&gt;</a> | Describes the upper limit of values. |

### 6.2.30 CommsRateMegabitsPerSecondTolerance

**Namespace:** UMAA::Common::Measurement::CommsRateMegabitsPerSecondTolerance

**Description:** Realizes CommsRateToleranceType: an ObservableTolerance that specifies the range of allowable values for a commsRate attribute.

**Table 427:** CommsRateMegabitsPerSecondTolerance Structure Definition

| Attribute Name | Attribute Type                             | Attribute Description                |
|----------------|--------------------------------------------|--------------------------------------|
| lowerLimit     | <a href="#">CommsRateMegabitsPerSecond</a> | Describes the lower limit of values. |
| upperLimit     | <a href="#">CommsRateMegabitsPerSecond</a> | Describes the upper limit of values. |

### 6.2.31 CountCapability

**Namespace:** UMAA::Common::Capabilities::CountCapability

**Description:** Realizes CountCapabilityType: a ResourceCapability which specifies a "number of elements in a group" capability.

**Table 428:** CountCapability Structure Definition

| Attribute Name | Attribute Type                     | Attribute Description          |
|----------------|------------------------------------|--------------------------------|
| count          | <a href="#">Count</a>              | Describes the count.           |
| countDomain    | <a href="#">CountSpecification</a> | Describes the count domain.    |
| countSetPoint  | <a href="#">CountRequirement</a>   | Describes the count set point. |

### 6.2.32 CountRequirement

**Namespace:** UMAA::Common::Requirements::CountRequirement

**Description:** Realizes CountRequirementType: a Requirement that specifies the type of a number of elements in a group.

**Table 429:** CountRequirement Structure Definition

| Attribute Name | Attribute Type                 | Attribute Description          |
|----------------|--------------------------------|--------------------------------|
| count          | <a href="#">Count</a>          | Describes the count.           |
| countTolerance | <a href="#">CountTolerance</a> | Describes the count tolerance. |

### 6.2.33 CountSpecification

**Namespace:** UMAA::Common::Measurement::CountSpecification

**Description:** Realizes SizeSpecType: an ObservableSpecification that specifies the range(s) of allowable values for a size attribute.

**Table 430:** CountSpecification Structure Definition

| Attribute Name | Attribute Type                    | Attribute Description                |
|----------------|-----------------------------------|--------------------------------------|
| lowerLimit     | sequence< <a href="#">Count</a> > | Describes the lower limit of values. |
| upperLimit     | sequence< <a href="#">Count</a> > | Describes the upper limit of values. |

### 6.2.34 CountTolerance

**Namespace:** UMAA::Common::Measurement::CountTolerance

**Description:** Realizes SizeToleranceType: an ObservableTolerance that specifies the range of allowable values for a size attribute.

**Table 431:** CountTolerance Structure Definition

| Attribute Name | Attribute Type        | Attribute Description                |
|----------------|-----------------------|--------------------------------------|
| lowerLimit     | <a href="#">Count</a> | Describes the lower limit of values. |
| upperLimit     | <a href="#">Count</a> | Describes the upper limit of values. |

### 6.2.35 CovarOrientationType

**Namespace:** UMAA::Common::Measurement::CovarOrientationType

**Description:** Contains variances and covariances for random variables representing estimates of Observable values. Given an Observable with true value  $x$  the estimated value  $\hat{x}$  is taken to be a random variable with sample space and distribution determined by the random processes which contribute to the calculation of the sampled Observable estimation. The ObservableError for the Observable is defined to be the Mean Squared Error,  $MSE = E[(\hat{x} - x)^2]$ . The MSE is equal to the sum of the variance of  $\hat{x}$  and the square of the estimation bias:  $MSE = Var[\hat{x}] + Bias[\hat{x}]^2 = E[(\hat{x} - E[\hat{x}])^2] - E[\hat{x} - x]^2$ . The variance of  $\hat{x}$  is equal to the MSE, and provides an estimate of the ObservableError, if and only if the underlying estimation process is unbiased.

**Table 432:** CovarOrientationType Structure Definition

| Attribute Name | Attribute Type                   | Attribute Description                                                   |
|----------------|----------------------------------|-------------------------------------------------------------------------|
| rpRp           | <a href="#">CovarOrientation</a> | Pitch-Pitch angle-angle error covariance with units of radians squared. |
| rpRy†          | <a href="#">CovarOrientation</a> | Pitch-Yaw angle-angle error covariance with units of radians squared.   |
| rrRp†          | <a href="#">CovarOrientation</a> | Roll-Pitch angle-angle error covariance with units of radians squared.  |
| rrRr           | <a href="#">CovarOrientation</a> | Roll-Roll angle-angle error covariance with units of radians squared.   |
| rrRy†          | <a href="#">CovarOrientation</a> | Roll-Yaw angle-angle error covariance with units of radians squared.    |
| ryRy           | <a href="#">CovarOrientation</a> | Yaw-Yaw angle-angle error covariance with units of radians squared.     |

### 6.2.36 CovarianceNEDAccelerationAccelerationType

**Namespace:** UMAA::Common::Measurement::CovarianceNEDAccelerationAccelerationType

**Description:** An Entity that specifies a range of uncertainty for values of an Observable, usually an Observable associated with kinematics. They are used with a corresponding Observable as attributes of ResourceTypes which provide such state information. An ObservableError may be expressed as a lower and upper limit, delta values, or squares of the Observable, depending on the Frame of Reference and Coordinate Set used for the Observable. The number of values which constitutes the ObservableError is also dependent on the dimensionality of the Observable. Since Frame of Reference, Coordinates, and Dimensionality are determined in refinements specified in the Logical Data Model, the selection of attributes for specializations of this Entity are undefined in the CDM.

**Table 433:** CovarianceNEDAccelerationAccelerationType Structure Definition

| Attribute Name | Attribute Type                     | Attribute Description                |
|----------------|------------------------------------|--------------------------------------|
| adAd           | <a href="#">AccelerationScalar</a> | Down-Down acceleration covariance.   |
| aeAd           | <a href="#">AccelerationScalar</a> | East-Down acceleration covariance.   |
| aeAe           | <a href="#">AccelerationScalar</a> | East-East acceleration covariance.   |
| anAd           | <a href="#">AccelerationScalar</a> | North-Down acceleration covariance.  |
| anAe           | <a href="#">AccelerationScalar</a> | North-East acceleration covariance.  |
| anAn           | <a href="#">AccelerationScalar</a> | North-North acceleration covariance. |

### 6.2.37 CovarianceOrientationAccelerationAccelerationType

**Namespace:** UMAA::Common::Measurement::CovarianceOrientationAccelerationAccelerationType

**Description:** An Entity that specifies a range of uncertainty for values of an Observable, usually an Observable associated with kinematics. They are used with a corresponding Observable as attributes of ResourceTypes which provide such state information. An ObservableError may be expressed as a lower and upper limit, delta values, or squares of the Observable, depending on the Frame of Reference and Coordinate Set used for the Observable. The number of values which constitutes the ObservableError is also dependent on the dimensionality of the Observable. Since Frame of Reference, Coordinates, and Dimensionality are determined in refinements specified in the Logical Data Model, the selection of attributes for specializations of this Entity are undefined in the CDM.

**Table 434:** CovarianceOrientationAccelerationAccelerationType Structure Definition

| Attribute Name | Attribute Type                    | Attribute Description               |
|----------------|-----------------------------------|-------------------------------------|
| apAp           | <a href="#">AngleAcceleration</a> | Pitch-Pitch angle-angle covariance. |
| apAy           | <a href="#">AngleAcceleration</a> | Pitch-Yaw angle-angle covariance.   |
| arAp           | <a href="#">AngleAcceleration</a> | Roll-Pitch angle-angle covariance.  |
| arAr           | <a href="#">AngleAcceleration</a> | Roll-Roll angle-angle covariance.   |
| arAy           | <a href="#">AngleAcceleration</a> | Roll-Yaw angle-angle covariance.    |
| ayAy           | <a href="#">AngleAcceleration</a> | Yaw-Yaw angle-angle covariance.     |

### 6.2.38 CovariancePolarType

**Namespace:** UMAA::Common::Measurement::CovariancePolarType

**Description:** Contains variances and covariances for random variables representing estimates of Observable values. Given an Observable with true value  $x$  the estimated value  $\hat{x}$  is taken to be a random variable with sample space and distribution determined by the random processes which contribute to the calculation of the sampled Observable estimation. The ObservableError for the Observable is defined to be the Mean Squared Error,  $MSE = E[(\hat{x} - x)^2]$ . The MSE is equal to the sum of the variance of  $\hat{x}$  and the square of the estimation bias:  $MSE = Var[\hat{x}] + Bias[\hat{x}]^2 = E[(\hat{x} - E[\hat{x}])^2] - E[\hat{x} - x]^2$ . The variance of  $\hat{x}$  is equal to the MSE, and provides an estimate of the ObservableError, if and only if the underlying estimation process is unbiased.

**Table 435:** CovariancePolarType Structure Definition

| Attribute Name | Attribute Type                  | Attribute Description                                                         |
|----------------|---------------------------------|-------------------------------------------------------------------------------|
| abAb           | <a href="#">CovarAngleAngle</a> | Bearing-Bearing angle error covariance with units of radians squared.         |
| aiAb†          | <a href="#">CovarAngleAngle</a> | Inclination-Bearing angle error covariance with units of radians squared.     |
| aiAi           | <a href="#">CovarAngleAngle</a> | Inclination-Inclination angle error covariance with units of radians squared. |
| arAb†          | <a href="#">CovarDisAngle</a>   | Range-Bearing error covariance with units of radians-meters.                  |
| arAi†          | <a href="#">CovarDisAngle</a>   | Range-Inclination error covariance with units of radians-meters.              |
| arAr           | <a href="#">CovarDisDis</a>     | Range-Range distance error covariance with units of meters squared.           |

### 6.2.39 CovariancePositionNEDType

**Namespace:** UMAA::Common::Measurement::CovariancePositionNEDType

**Description:** Contains variances and covariances for random variables representing estimates of Observable values. Given an Observable with true value  $x$  the estimated value  $\hat{x}$  is taken to be a random variable with sample space and distribution determined by the random processes which contribute to the calculation of the sampled Observable estimation. The ObservableError for the Observable is defined to be the Mean Squared Error,  $MSE = E[(\hat{x} - x)^2]$ . The MSE is equal to the sum of the variance of  $\hat{x}$  and the square of the estimation bias:  $MSE = Var[\hat{x}] + Bias[\hat{x}]^2 = E[(\hat{x} - E[\hat{x}])^2] - E[\hat{x} - x]^2$ . The variance of  $\hat{x}$  is equal to the MSE, and provides an estimate of the ObservableError, if and only if the underlying estimation process is unbiased.

**Table 436:** CovariancePositionNEDType Structure Definition

| Attribute Name | Attribute Type                 | Attribute Description                                               |
|----------------|--------------------------------|---------------------------------------------------------------------|
| pdPd†          | <a href="#">CovarPosPosNED</a> | Down-Down position error covariance with units of meters squared.   |
| pePd†          | <a href="#">CovarPosPosNED</a> | East-Down position error covariance with units of meters squared.   |
| pePe           | <a href="#">CovarPosPosNED</a> | East-East position error covariance with units of meters squared.   |
| pnPd†          | <a href="#">CovarPosPosNED</a> | North-Down position error covariance with units of meters squared.  |
| pnPe†          | <a href="#">CovarPosPosNED</a> | North-East position error covariance with units of meters squared.  |
| pnPn           | <a href="#">CovarPosPosNED</a> | North-North position error covariance with units of meters squared. |

### 6.2.40 DateTimeRequirement

**Namespace:** UMAA::Common::Requirements::DateTimeRequirement

**Description:** Realizes TimeRequirementType: a Requirement that specifies the type of time.

**Table 437:** DateTimeRequirement Structure Definition

| Attribute Name | Attribute Type                    | Attribute Description              |
|----------------|-----------------------------------|------------------------------------|
| time           | <a href="#">DateTime</a>          | Describes the required time value. |
| timeTolerance  | <a href="#">DateTimeTolerance</a> | Describes the time tolerance.      |

### 6.2.41 DateTimeTolerance

**Namespace:** UMAA::Common::Measurement::DateTimeTolerance

**Description:** Realizes TimeToleranceType: an ObservableTolerance that specifies the range of allowable values for a time attribute.

**Table 438:** DateTimeTolerance Structure Definition

| Attribute Name | Attribute Type           | Attribute Description                          |
|----------------|--------------------------|------------------------------------------------|
| lowerLimit     | <a href="#">DateTime</a> | specifies the minimum value of the time point. |
| upperLimit     | <a href="#">DateTime</a> | specifies the maximum value of time point.     |

#### 6.2.42 DepthType

**Namespace:** UMAA::Common::Measurement::DepthType

**Description:** Defines the depth below sea level.

**Table 439:** DepthType Structure Definition

| Attribute Name | Attribute Type              | Attribute Description      |
|----------------|-----------------------------|----------------------------|
| depth          | <a href="#">DistanceBSL</a> | The depth below sea level. |

#### 6.2.43 DigitalSensorErrorType

**Namespace:** UMAA::SEM::SensorManagement::DigitalSensorErrorType

**Description:** This structure is used to report error code when the specified digital sensor configuration is set to be invalid.

**Table 440:** DigitalSensorErrorType Structure Definition

| Attribute Name | Attribute Type                                 | Attribute Description                                                                    |
|----------------|------------------------------------------------|------------------------------------------------------------------------------------------|
| errorCode      | <a href="#">DigitalSensorErrorCodeEnumType</a> | Error code reports when the specified digital sensor configuration is set to be invalid. |
| errorMessage   | <a href="#">StringShortDescription</a>         | A description of the invalid digital sensor configuration setting.                       |

#### 6.2.44 DirectionCurrentRequirement

**Namespace:** UMAA::Common::Orientation::DirectionCurrentRequirement

**Description:** A requirement that specifies the direction with respect to the current.

**Table 441:** DirectionCurrentRequirement Structure Definition

| Attribute Name     | Attribute Type                          | Attribute Description                                                    |
|--------------------|-----------------------------------------|--------------------------------------------------------------------------|
| direction          | <a href="#">HeadingCurrentDirection</a> | Specifies the heading offset angle relative to the current.              |
| directionTolerance | <a href="#">DirectionToleranceType</a>  | Specifies the heading reference angle tolerance relative to the current. |

### 6.2.45 DirectionMagneticNorthRequirement

**Namespace:** UMAA::Common::Orientation::DirectionMagneticNorthRequirement

**Description:** A requirement that specifies the direction with respect to magnetic north.

**Table 442:** DirectionMagneticNorthRequirement Structure Definition

| Attribute Name     | Attribute Type                         | Attribute Description                                                       |
|--------------------|----------------------------------------|-----------------------------------------------------------------------------|
| direction          | <a href="#">HeadingMagneticNorth</a>   | Specifies the heading reference angle relative to magnetic north.           |
| directionTolerance | <a href="#">DirectionToleranceType</a> | Specifies the heading reference angle tolerance relative to magnetic north. |

### 6.2.46 DirectionRequirementType

**Namespace:** UMAA::Common::Orientation::DirectionRequirementType

**Description:** **Union Type.** Direction of the vehicle motion or pattern being performed.

**Table 443:** DirectionRequirementType Union(s)

| Type Name                                         | Type Description                                                                      |
|---------------------------------------------------|---------------------------------------------------------------------------------------|
| <a href="#">DirectionCurrentRequirement</a>       | A requirement that specifies the direction with respect to the current.               |
| <a href="#">DirectionMagneticNorthRequirement</a> | A requirement that specifies the direction with respect to magnetic north.            |
| <a href="#">DirectionTrueNorthRequirement</a>     | A requirement that specifies the direction with respect to true north.                |
| <a href="#">DirectionWindRequirement</a>          | A requirement that specifies the direction with respect to the direction of the wind. |

### 6.2.47 DirectionToleranceType

**Namespace:** UMAA::Common::Orientation::DirectionToleranceType

**Description:** An angle tolerance associated with a direction.

**Table 444:** DirectionToleranceType Structure Definition

| Attribute Name | Attribute Type        | Attribute Description                                                        |
|----------------|-----------------------|------------------------------------------------------------------------------|
| lowerlimit     | <a href="#">Angle</a> | Describes the direction bound counterclockwise from the specified direction. |
| upperlimit     | <a href="#">Angle</a> | Describes the direction bound clockwise from the specified direction.        |

### 6.2.48 DirectionTrueNorthRequirement

**Namespace:** UMAA::Common::Orientation::DirectionTrueNorthRequirement

**Description:** A requirement that specifies the direction with respect to true north.

**Table 445:** DirectionTrueNorthRequirement Structure Definition

| Attribute Name     | Attribute Type                         | Attribute Description                                                   |
|--------------------|----------------------------------------|-------------------------------------------------------------------------|
| direction          | <a href="#">HeadingTrueNorthAngle</a>  | Specifies the heading reference angle relative to true north.           |
| directionTolerance | <a href="#">DirectionToleranceType</a> | Specifies the heading reference angle tolerance relative to true north. |

#### 6.2.49 DirectionWindRequirement

**Namespace:** UMAA::Common::Orientation::DirectionWindRequirement

**Description:** A requirement that specifies the direction with respect to the direction of the wind.

**Table 446:** DirectionWindRequirement Structure Definition

| Attribute Name     | Attribute Type                         | Attribute Description                                                           |
|--------------------|----------------------------------------|---------------------------------------------------------------------------------|
| direction          | <a href="#">HeadingWindDirection</a>   | Specifies the heading reference angle relative to the wind direction.           |
| directionTolerance | <a href="#">DirectionToleranceType</a> | Specifies the heading reference angle tolerance relative to the wind direction. |

#### 6.2.50 DistanceRequirement

**Namespace:** UMAA::Common::Requirements::DistanceRequirement

**Description:** Realizes DistanceRequirementType: a Requirement that specifies the type of distance.

**Table 447:** DistanceRequirement Structure Definition

| Attribute Name    | Attribute Type                    | Attribute Description                      |
|-------------------|-----------------------------------|--------------------------------------------|
| distance          | <a href="#">Distance</a>          | Describes the required distance value.     |
| distanceTolerance | <a href="#">DistanceTolerance</a> | Describes the required distance tolerance. |

#### 6.2.51 DistanceTolerance

**Namespace:** UMAA::Common::Measurement::DistanceTolerance

**Description:** Realizes DistanceToleranceType: an ObservableTolerance that specifies the range of allowable values for a distance attribute.

**Table 448:** DistanceTolerance Structure Definition

| Attribute Name | Attribute Type           | Attribute Description                |
|----------------|--------------------------|--------------------------------------|
| lowerLimit     | <a href="#">Distance</a> | Describes the lower limit of values. |
| upperLimit     | <a href="#">Distance</a> | Describes the upper limit of values. |

### 6.2.52 ElevationType

**Namespace:** UMAA::Common::Measurement::ElevationType

**Description:** **Union Type.** Elevation in either altitude from sea floor or depth from surface (other altitude options support above ground and sea level for potential hybrid vehicles).

**Table 449:** ElevationType Union(s)

| Type Name                            | Type Description                                         |
|--------------------------------------|----------------------------------------------------------|
| <a href="#">AltitudeAGLType</a>      | The height above ground level.                           |
| <a href="#">AltitudeASFTYPE</a>      | The height above sea floor.                              |
| <a href="#">AltitudeGeodeticType</a> | The geodetic height above the ellipsoid.                 |
| <a href="#">AltitudeMSLType</a>      | The orthometric height above the Geoid (Mean Sea Level). |
| <a href="#">DepthType</a>            | Defines the depth below sea level.                       |

### 6.2.53 EngineRPM

**Namespace:** UMAA::Common::Speed::EngineRPM

**Description:** Defines the engine RPM.

**Table 450:** EngineRPM Structure Definition

| Attribute Name | Attribute Type                            | Attribute Description |
|----------------|-------------------------------------------|-----------------------|
| rpm            | <a href="#">EngineRPMSpeedRequirement</a> | Specifies engine rpm. |

### 6.2.54 EngineRPMSpeedRequirement

**Namespace:** UMAA::Common::Speed::EngineRPMSpeedRequirement

**Description:** Defines the engine rpm.

**Table 451:** EngineRPMSpeedRequirement Structure Definition

| Attribute Name | Attribute Type                          | Attribute Description                      |
|----------------|-----------------------------------------|--------------------------------------------|
| speed          | <a href="#">FrequencyRPM</a>            | Specifies speed via engine rpm.            |
| speedTolerance | <a href="#">EngineRPMSpeedTolerance</a> | Specifies the tolerance for an engine rpm. |

### 6.2.55 EngineRPMSpeedTolerance

**Namespace:** UMAA::Common::Speed::EngineRPMSpeedTolerance

**Description:** Defines the speed through engine rpm.

**Table 452:** EngineRPMSpeedTolerance Structure Definition

| Attribute Name | Attribute Type | Attribute Description                                             |
|----------------|----------------|-------------------------------------------------------------------|
| lowerlimit     | FrequencyRPM   | Specifies the lower limit of allowable values for the engine rpm. |
| upperlimit     | FrequencyRPM   | Specifies the upper limit of allowable values for the engine rpm. |

### 6.2.56 FeatureImagePairType

**Namespace:** UMAA::Common::Environment::FeatureImagePairType

**Description:** This is a base structure used to report the feature/image pair being disposed of.

**Table 453:** FeatureImagePairType Structure Definition

| Attribute Name | Attribute Type | Attribute Description         |
|----------------|----------------|-------------------------------|
| featureID      | NumericGUID    | An identifier of the feature. |
| imageID        | NumericGUID    | An identifier of the image.   |

### 6.2.57 GammaAnglePropulsorRequirement

**Namespace:** UMAA::Common::Requirements::GammaAnglePropulsorRequirement

**Description:** Describes the required value of the propulsor's gamma angle.

**Table 454:** GammaAnglePropulsorRequirement Structure Definition

| Attribute Name               | Attribute Type               | Attribute Description                           |
|------------------------------|------------------------------|-------------------------------------------------|
| gammaAnglePropulsor          | GammaAnglePropulsor          | Describes the required gamma value.             |
| gammaAnglePropulsorTolerance | GammaAnglePropulsorTolerance | Describes the required gamma value's tolerance. |

### 6.2.58 GammaAnglePropulsorTolerance

**Namespace:** UMAA::Common::MeasurementTolerances::GammaAnglePropulsorTolerance

**Description:** Describes a tolerance range for the required gamma value.

**Table 455:** GammaAnglePropulsorTolerance Structure Definition

| Attribute Name | Attribute Type      | Attribute Description      |
|----------------|---------------------|----------------------------|
| lowerLimit     | GammaAnglePropulsor | Describes the lower limit. |
| upperLimit     | GammaAnglePropulsor | Describes the upper limit. |

### 6.2.59 GammaZPlatformType

**Namespace:** UMAA::Common::Orientation::GammaZPlatformType

**Description:** A requirement that specifies a gamma angle relative to the Platform coordinate system.

**Table 456:** GammaZPlatformType Structure Definition

| Attribute Name | Attribute Type              | Attribute Description                                             |
|----------------|-----------------------------|-------------------------------------------------------------------|
| gamma          | <a href="#">YawPosAngle</a> | Defines a gamma angle relative to the Platform coordinate system. |

### 6.2.60 GeoPosition2D

**Namespace:** UMAA::Common::Measurement::GeoPosition2D

**Description:** Specifies a location on the surface of the Earth.

**Table 457:** GeoPosition2D Structure Definition

| Attribute Name    | Attribute Type                    | Attribute Description                                 |
|-------------------|-----------------------------------|-------------------------------------------------------|
| geodeticLatitude  | <a href="#">GeodeticLatitude</a>  | Specifies the north-south coordinate of the position. |
| geodeticLongitude | <a href="#">GeodeticLongitude</a> | Specifies the east-west coordinate of the position.   |

### 6.2.61 GeoPosition2DRequirement

**Namespace:** UMAA::Common::Position::GeoPosition2DRequirement

**Description:** Defines a position requirement.

**Table 458:** GeoPosition2DRequirement Structure Definition

| Attribute Name | Attribute Type                         | Attribute Description                      |
|----------------|----------------------------------------|--------------------------------------------|
| tolerance      | <a href="#">GeoPosition2DTolerance</a> | Specifies the required position tolerance. |
| value          | <a href="#">GeoPosition2D</a>          | Specifies the required position.           |

### 6.2.62 GeoPosition2DTime

**Namespace:** UMAA::Common::Measurement::GeoPosition2DTime

**Description:** Specifies a location on the surface of the Earth at a given point in time.

**Table 459:** GeoPosition2DTime Structure Definition

| Attribute Name   | Attribute Type                | Attribute Description                                                                                     |
|------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------|
| geodeticPosition | <a href="#">GeoPosition2D</a> | Specifies a location on the surface of the Earth.                                                         |
| timeAtPosition   | <a href="#">DateTime</a>      | Specifies the date and time when this position is considered valid or an associated measurement was made. |

### 6.2.63 GeoPosition2DTolerance

**Namespace:** UMAA::Common::Position::GeoPosition2DTolerance

**Description:** Defines a position tolerance.

**Table 460:** GeoPosition2DTolerance Structure Definition

| Attribute Name | Attribute Type           | Attribute Description                 |
|----------------|--------------------------|---------------------------------------|
| limit          | <a href="#">Distance</a> | Specifies the limit of the tolerance. |

### 6.2.64 GeoPosition3DWGS84

**Namespace:** UMAA::Common::Measurement::GeoPosition3DWGS84

**Description:** Specifies a location relative to the ellipsoid.

**Table 461:** GeoPosition3DWGS84 Structure Definition

| Attribute Name   | Attribute Type                   | Attribute Description                             |
|------------------|----------------------------------|---------------------------------------------------|
| geodeticAltitude | <a href="#">GeodeticAltitude</a> | Specifies the height above the ellipsoid.         |
| geodeticPosition | <a href="#">GeoPosition2D</a>    | Specifies a location on the surface of the Earth. |

### 6.2.65 GroundSpeedRequirement

**Namespace:** UMAA::Common::Speed::GroundSpeedRequirement

**Description:** Defines the speed over ground.

**Table 462:** GroundSpeedRequirement Structure Definition

| Attribute Name | Attribute Type                       | Attribute Description                            |
|----------------|--------------------------------------|--------------------------------------------------|
| speed          | <a href="#">GroundSpeed</a>          | Specifies speed over ground.                     |
| speedTolerance | <a href="#">GroundSpeedTolerance</a> | Specifies the tolerance for a speed over ground. |

### 6.2.66 GroundSpeedTolerance

**Namespace:** UMAA::Common::Speed::GroundSpeedTolerance

**Description:** Defines the speed over ground tolerance.

**Table 463:** GroundSpeedTolerance Structure Definition

| Attribute Name | Attribute Type | Attribute Description                                               |
|----------------|----------------|---------------------------------------------------------------------|
| lowerlimit     | GroundSpeed    | Specifies the lower limit of allowable values for the ground speed. |
| upperlimit     | GroundSpeed    | Specifies the upper limit of allowable values for the ground speed. |

### 6.2.67 JointOperationalParamsType

**Namespace:** UMAA::SEM::ExtendedPayloadStatus::JointOperationalParamsType

**Description:** This structure is used to report the operational parameters of a single manipulator joint.

**Table 464:** JointOperationalParamsType Structure Definition

| Attribute Name | Attribute Type        | Attribute Description                                                |
|----------------|-----------------------|----------------------------------------------------------------------|
| params         | OperationalParamsType | The operational parameters of this joint.                            |
| jointID*       | NumericGUID           | Unique Identifier of the manipulator joint (within the manipulator). |

### 6.2.68 LevelType

**Namespace:** UMAA::Common::Measurement::LevelType

**Description:** Defines the desired percentage filled or empty level of the ballast tank.

**Table 465:** LevelType Structure Definition

| Attribute Name | Attribute Type | Attribute Description                                                       |
|----------------|----------------|-----------------------------------------------------------------------------|
| level          | VolumePercent  | Specifies The desired percentage filled or empty level of the ballast tank. |

### 6.2.69 LocalDriftStateType

**Namespace:** UMAA::MO::LocalDriftState::LocalDriftStateType

**Description: Union Type.** State of the local drift. While first transiting to the drift position, the selector will be LocalTransitDriftType until the position and elevation are first achieved within their respective tolerances. Once achieved, the union selector will change to LocalRegionDriftType. The selector will not change as a result of any of the LocalRegionDriftType achievements states being lost and regained as a result of tolerance settings being violated. This is true until the service determines that the elevation or drift tolerances are violated by a sufficient margin that it is more effective for the vehicle to return to transiting to the drift location. In that case, the LocalRegionDriftType reverts to the LocalTransitDriftType selector and those transit achievements then are actively set.

**Table 466:** LocalDriftStateType Union(s)

| Type Name                             | Type Description                                                    |
|---------------------------------------|---------------------------------------------------------------------|
| <a href="#">LocalRegionDriftType</a>  | Indicates that the vehicle is in the local drift region.            |
| <a href="#">LocalTransitDriftType</a> | Indicates that the vehicle is in transit to the local drift region. |

### 6.2.70 LocalFigure8PatternType

**Namespace:** UMAA::MO::LocalFigure8State::LocalFigure8PatternType

**Description:** Indicates that the local figure 8 pattern is currently executing.

**Table 467:** LocalFigure8PatternType Structure Definition

| Attribute Name    | Attribute Type          | Attribute Description                                                                                                                                                                              |
|-------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| elevationAchieved | <a href="#">boolean</a> | Indicates that the elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.                                    |
| positionAchieved  | <a href="#">boolean</a> | When the pattern is executing, this indicates that the position requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |
| speedAchieved     | <a href="#">boolean</a> | When the pattern is executing, this indicates that the speed requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.    |

### 6.2.71 LocalFigure8StateType

**Namespace:** UMAA::MO::LocalFigure8State::LocalFigure8StateType

**Description: Union Type.** State of the local figure 8 pattern being executed. While first transiting to the figure 8 pattern to be performed, the selector will be [LocalFigure8TransitType](#) until the pattern position, speed, and elevation are first achieved within their respective tolerances. Once achieved, the union selector will change to [LocalFigure8PatternType](#). The selector will not change as a result of any of the [LocalFigure8PatternType](#) achievements states being lost and regained as a result of tolerance settings being violated. The service is expected to make driving adjustments to attempt to keep all achievement states satisfied. This is true until the service determines tolerance(s) are violated by a sufficient margin that it is more effective for the vehicle to return to transiting to the pattern location. In that case, the [LocalFigure8StateType](#) reverts to the [LocalFigure8TransitType](#) selector and those transit achievements are then set.

**Table 468:** LocalFigure8StateType Union(s)

| Type Name                               | Type Description                                                                                 |
|-----------------------------------------|--------------------------------------------------------------------------------------------------|
| <a href="#">LocalFigure8PatternType</a> | Indicates that the local figure 8 pattern is currently executing.                                |
| <a href="#">LocalFigure8TransitType</a> | Indicates that the vehicle is in transit to where the local figure 8 pattern is to be performed. |

### 6.2.72 LocalFigure8TransitType

**Namespace:** UMAA::MO::LocalFigure8State::LocalFigure8TransitType

**Description:** Indicates that the vehicle is in transit to where the local figure 8 pattern is to be performed.

**Table 469:** LocalFigure8TransitType Structure Definition

| Attribute Name           | Attribute Type | Attribute Description                                                                                                                                                   |
|--------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| transitElevationAchieved | boolean        | Indicates that the transit elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |
| transitSpeedAchieved     | boolean        | Indicates that the transit speed requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.     |

### 6.2.73 LocalHoverStateType

**Namespace:** UMAA::MO::LocalHoverState::LocalHoverStateType

**Description: Union Type.** State of the local hover. While first transiting to the hover location, the selector will be LocalTransitHoverType until the position, heading, and elevation are first achieved within their respective tolerances. Once achieved, the union selector will change to LocalHoveringHoverType. The selector will not change as a result of any of the LocalHoveringHoverType achievements states being lost and regained as a result of tolerance settings being violated. The service is expected to make driving adjustments to attempt to keep all achievement states satisfied. This is true until the service determines that tolerance(s) are violated by a sufficient margin that it is more effective for the vehicle to return to transiting to the hover location. In that case, the LocalHoverStateType reverts to the LocalTransitHoverType selector and those transit achievements then are actively set.

**Table 470:** LocalHoverStateType Union(s)

| Type Name              | Type Description                                                                      |
|------------------------|---------------------------------------------------------------------------------------|
| LocalHoveringHoverType | Indicates that the local hover is currently executing.                                |
| LocalTransitHoverType  | Indicates that the vehicle is in transit to where the local hover is to be performed. |

### 6.2.74 LocalHoveringHoverType

**Namespace:** UMAA::MO::LocalHoverState::LocalHoveringHoverType

**Description:** Indicates that the local hover is currently executing.

**Table 471:** LocalHoveringHoverType Structure Definition

| Attribute Name    | Attribute Type | Attribute Description                                                                                                                                           |
|-------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| elevationAchieved | boolean        | Indicates that the elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |
| positionAchieved  | boolean        | Indicates that the position requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.  |

### 6.2.75 LocalRacetrackPatternType

**Namespace:** UMAA::MO::LocalRacetrackState::LocalRacetrackPatternType

**Description:** Indicates that the local racetrack pattern is currently executing.

**Table 472:** LocalRacetrackPatternType Structure Definition

| Attribute Name    | Attribute Type | Attribute Description                                                                                                                                           |
|-------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| elevationAchieved | boolean        | Indicates that the elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |
| positionAchieved  | boolean        | Indicates that the position requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.  |
| speedAchieved     | boolean        | Indicates that the speed requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.     |

### 6.2.76 LocalRacetrackStateType

**Namespace:** UMAA::MO::LocalRacetrackState::LocalRacetrackStateType

**Description: Union Type.** State of the local racetrack pattern being executed. While first transiting to the racetrack location to be performed, the selector will be LocalRacetrackTransitType until the pattern position, speed, and elevation are first achieved within their respective tolerances. Once achieved, the union selector will change to LocalRacetrackPatternType. The selector will not change as a result of any of the LocalRacetrackPatternType achievements states being lost and regained as a result of tolerance settings being violated. The service is expected to make driving adjustments to attempt to keep all achievement states satisfied. This is true until the service determines that tolerance(s) are violated by a sufficient margin that it is more effective for the vehicle to return to transiting to the racetrack location. In that case, the LocalRacetrackStateType reverts to the LocalRacetrackTransitType selector and those transit achievements are then set.

**Table 473:** LocalRacetrackStateType Union(s)

| Type Name                 | Type Description                                                                                  |
|---------------------------|---------------------------------------------------------------------------------------------------|
| LocalRacetrackPatternType | Indicates that the local racetrack pattern is currently executing.                                |
| LocalRacetrackTransitType | Indicates that the vehicle is in transit to where the local racetrack pattern is to be performed. |

### 6.2.77 LocalRacetrackTransitType

**Namespace:** UMAA::MO::LocalRacetrackState::LocalRacetrackTransitType

**Description:** Indicates that the vehicle is in transit to where the local racetrack pattern is to be performed.

**Table 474:** LocalRacetrackTransitType Structure Definition

| Attribute Name           | Attribute Type | Attribute Description                                                                                                                                                   |
|--------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| transitElevationAchieved | boolean        | Indicates that the transit elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |
| transitSpeedAchieved     | boolean        | Indicates that the transit speed requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.     |

### 6.2.78 LocalRegionDriftType

**Namespace:** UMAA::MO::LocalDriftState::LocalRegionDriftType

**Description:** Indicates that the vehicle is in the local drift region.

**Table 475:** LocalRegionDriftType Structure Definition

| Attribute Name    | Attribute Type | Attribute Description                                                                                                                                           |
|-------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| elevationAchieved | boolean        | Indicates that the elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |
| positionAchieved  | boolean        | Indicates that the position requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.  |

### 6.2.79 LocalRegularPolygonPatternType

**Namespace:** UMAA::MO::LocalRegularPolygonState::LocalRegularPolygonPatternType

**Description:** Indicates that the local regular polygon pattern is currently executing.

**Table 476:** LocalRegularPolygonPatternType Structure Definition

| Attribute Name    | Attribute Type | Attribute Description                                                                                                                                           |
|-------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| elevationAchieved | boolean        | Indicates that the elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |
| positionAchieved  | boolean        | Indicates that the position requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.  |
| speedAchieved     | boolean        | Indicates that the speed requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.     |

### 6.2.80 LocalRegularPolygonStateType

**Namespace:** UMAA::MO::LocalRegularPolygonState::LocalRegularPolygonStateType

**Description: Union Type.** State of the local regular polygon pattern being executed. While first transiting to the regular polygon location to be performed, the selector will be LocalRegularPolygonTransitType until the pattern position, speed, and elevation are first achieved within their respective tolerances. Once achieved, the union selector will change to LocalRegularPolygonPatternType. The selector will not change as a result of any of the LocalRegularPolygonPatternType achievements states being lost and regained as a result of tolerance settings being violated. The service is expected to make driving adjustments to attempt to keep all achievement states satisfied. This is true until the service determines that tolerance(s) are violated by a sufficient margin that it is more effective for the vehicle to return to transiting to regular polygon pattern location. In that case, the LocalRegularPolygonStateType reverts to the LocalRegularPolygonTransitType selector and those transit achievements are then set.

**Table 477:** LocalRegularPolygonStateType Union(s)

| Type Name                      | Type Description                                                                                        |
|--------------------------------|---------------------------------------------------------------------------------------------------------|
| LocalRegularPolygonPatternType | Indicates that the local regular polygon pattern is currently executing.                                |
| LocalRegularPolygonTransitType | Indicates that the vehicle is in transit to where the local regular polygon pattern is to be performed. |

### 6.2.81 LocalRegularPolygonTransitType

**Namespace:** UMAA::MO::LocalRegularPolygonState::LocalRegularPolygonTransitType

**Description:** Indicates that the vehicle is in transit to where the local regular polygon pattern is to be performed.

**Table 478:** LocalRegularPolygonTransitType Structure Definition

| Attribute Name           | Attribute Type | Attribute Description                                                                                                                                                   |
|--------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| transitElevationAchieved | boolean        | Indicates that the transit elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |
| transitSpeedAchieved     | boolean        | Indicates that the transit speed requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.     |

### 6.2.82 LocalTransitDriftType

**Namespace:** UMAA::MO::LocalDriftState::LocalTransitDriftType

**Description:** Indicates that the vehicle is in transit to the local drift region.

**Table 479:** LocalTransitDriftType Structure Definition

| Attribute Name           | Attribute Type | Attribute Description                                                                                                                                                   |
|--------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| transitElevationAchieved | boolean        | Indicates that the transit elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |

| Attribute Name       | Attribute Type | Attribute Description                                                                                                                                               |
|----------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| transitSpeedAchieved | boolean        | Indicates that the transit speed requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |

### 6.2.83 LocalTransitHoverType

**Namespace:** UMAA::MO::LocalHoverState::LocalTransitHoverType

**Description:** Indicates that the vehicle is in transit to where the local hover is to be performed.

**Table 480:** LocalTransitHoverType Structure Definition

| Attribute Name    | Attribute Type | Attribute Description                                                                                                                                                   |
|-------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| elevationAchieved | boolean        | Indicates that the transit elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |
| speedAchieved     | boolean        | Indicates that the transit speed requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.     |

### 6.2.84 LocalWaypointType

**Namespace:** UMAA::MO::LocalWaypointControl::LocalWaypointType

**Description:** The structure is used to describe a waypoint in a local reference frame.

**Table 481:** LocalWaypointType Structure Definition

| Attribute Name  | Attribute Type                | Attribute Description                                                                                                                                                                                                              |
|-----------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| attitude†       | Orientation3DNEDRequirement   | The desired orientation (roll, pitch, yaw) of the vehicle as arriving at the waypoint.                                                                                                                                             |
| elevation       | ElevationType                 | The desired elevation used for the vehicle. This value is 0 for USVs.                                                                                                                                                              |
| name†           | StringShortDescription        | A short name for the waypoint.                                                                                                                                                                                                     |
| position†       | Position2DLocalNEDRequirement | The desired waypoint position in the local coordinate system. When not specified, use current location.                                                                                                                            |
| speed           | VariableSpeedControlType      | The desired waypoint travel speed of the vehicle with reference to the medium, the ground, the air, RPM, or true speed.                                                                                                            |
| trackTolerance† | Distance                      | The desired tolerance of the path measured by distance. If defined, vehicle must maintain track, if not defined no need to maintain track. Use the vehicle position at time of command to define the track for the first waypoint. |
| waypointID      | NumericGUID                   | The desired id to keep track of the waypoint.                                                                                                                                                                                      |

**6.2.85 MassBallastFlowRateType****Namespace:** UMAA::EO::BallastTank::MassBallastFlowRateType**Description:** The desired flow rate to fill or empty the ballast pump measured by mass.**Table 482:** MassBallastFlowRateType Structure Definition

| Attribute Name      | Attribute Type | Attribute Description                                                               |
|---------------------|----------------|-------------------------------------------------------------------------------------|
| massBallastFlowRate | MassFlowRate   | Specifies the desired flow rate to fill or empty the ballast pump measured by mass. |

**6.2.86 MoveToPosPolicyType****Namespace:** UMAA::MM::CommsLostPolicy::MoveToPosPolicyType**Description:** This structure is used to report the move-to-position policy in case of lost communications of the vehicle.**Table 483:** MoveToPosPolicyType Structure Definition

| Attribute Name | Attribute Type                | Attribute Description                                                                    |
|----------------|-------------------------------|------------------------------------------------------------------------------------------|
| distance       | Distance                      | Travel distance while trying to regain comms.                                            |
| mode           | VehicleSpeedModeEnumType      | A speed mode.                                                                            |
| position       | WaypointType                  | Travel to a waypoint position while trying to regain comms.                              |
| speed          | Speed                         | A speed of the vehicle with reference to the medium, the ground, the air, or true speed. |
| speedReference | VehicleSpeedReferenceEnumType | A speed reference.                                                                       |

**6.2.87 OperationalParamsType****Namespace:** UMAA::SEM::ExtendedPayloadStatus::OperationalParamsType**Description:** This structure is used to report operational parameters of a subsystem.**Table 484:** OperationalParamsType Structure Definition

| Attribute Name | Attribute Type  | Attribute Description         |
|----------------|-----------------|-------------------------------|
| busCurrent     | PowerBusCurrent | Bus current of a subsystem.   |
| busVoltage     | PowerBusVoltage | Bus voltage of a subsystem.   |
| phaseCurrent   | PowerBusCurrent | Phase current of a subsystem. |
| temp           | Temperature     | Subsystem temperature.        |

### 6.2.88 Orientation3DNEDRequirement

**Namespace:** UMAA::Common::Orientation::Orientation3DNEDRequirement

**Description:** A requirement that describes a desired 3D orientation in a NED coordinate system.

**Table 485:** Orientation3DNEDRequirement Structure Definition

| Attribute Name | Attribute Type                       | Attribute Description                                  |
|----------------|--------------------------------------|--------------------------------------------------------|
| pitchY†        | <a href="#">PitchYNEDRequirement</a> | Defines a pitch relative to the NED coordinate system. |
| rollX†         | <a href="#">RollXNEDRequirement</a>  | Defines a roll relative to the NED coordinate system.  |
| yawZ           | <a href="#">YawZNEDRequirement</a>   | Defines a yaw relative to the NED coordinate system.   |

### 6.2.89 Orientation3DNEDType

**Namespace:** UMAA::Common::Orientation::Orientation3DNEDType

**Description:** A requirement that specifies an orientation relative to a North-East-Down coordinate system centered on the platform.

**Table 486:** Orientation3DNEDType Structure Definition

| Attribute Name | Attribute Type                | Attribute Description                                                                     |
|----------------|-------------------------------|-------------------------------------------------------------------------------------------|
| pitch          | <a href="#">PitchYNEDType</a> | Defines a pitch relative to a North-East-Down coordinate system centered on the platform. |
| roll           | <a href="#">RollXNEDType</a>  | Defines a roll relative to a North-East-Down coordinate system centered on the platform.  |
| yaw            | <a href="#">YawZNEDType</a>   | Defines a yaw relative to a North-East-Down coordinate system centered on the platform.   |

### 6.2.90 Orientation3DPlatformType

**Namespace:** UMAA::Common::Orientation::Orientation3DPlatformType

**Description:** A requirement that specifies an orientation relative to the Platform coordinate system.

**Table 487:** Orientation3DPlatformType Structure Definition

| Attribute Name | Attribute Type                     | Attribute Description                                              |
|----------------|------------------------------------|--------------------------------------------------------------------|
| alpha          | <a href="#">AlphaXPlatformType</a> | Defines an alpha angle relative to the Platform coordinate system. |
| beta           | <a href="#">BetaYPlatformType</a>  | Defines a beta angle relative to the Platform coordinate system.   |
| gamma          | <a href="#">GammaZPlatformType</a> | Defines a gamma angle relative to the Platform coordinate system.  |

### 6.2.91 OrientationAcceleration3D

**Namespace:** UMAA::Common::Measurement::OrientationAcceleration3D

**Description:** OrientationAcceleration3D specifies the acceleration for each axis of an Orientation.

**Table 488:** OrientationAcceleration3D Structure Definition

| Attribute Name | Attribute Type                    | Attribute Description                                                                                                                                                                                                              |
|----------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pitchAccelY    | <a href="#">PitchAcceleration</a> | pitchAccelY specifies the acceleration of the platform's rotation about the lateral axis (e.g. the axis parallel to the wings) in a locally level, XYZ coordinate system centered on the platform.                                 |
| rollAccelX     | <a href="#">RollAcceleration</a>  | rollAccelX specifies the acceleration of the platform's rotation about the longitudinal axis (e.g. the axis through the body of an aircraft from tail to nose) in a locally level, XYZ coordinate system centered on the platform. |
| yawAccelZ      | <a href="#">YawAcceleration</a>   | yawAccelZ specifies the acceleration of the platform's rotation about the vertical axis (e.g. the axis from top to bottom through an aircraft) in a locally level, XYZ coordinate system centered on the platform.                 |

### 6.2.92 PathReporterType

**Namespace:** UMAA::SA::PathReporterSpecs::PathReporterType

**Description:** This structure is used to report the capabilities the service supports. This implementation may support one or more types of path, and specify further limitations on the constraints used in the message querying the path. For example, an implementation may specify that it only supports a certain maximum number of points, and/or a fixed target resolution.

**Table 489:** PathReporterType Structure Definition

| Attribute Name   | Attribute Type                  | Attribute Description                                                                                                                                    |
|------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| maxDistance      | <a href="#">Distance</a>        | The maximum supported distance for the list of points to be returned.                                                                                    |
| maxPoints        | <a href="#">Count</a>           | The maximum supported element count for the list of points to be returned.                                                                               |
| maxTgtResolution | <a href="#">Distance</a>        | The maximum supported distance between reported path points. For implementations that do not support interpolation, the Min and Max should be identical. |
| maxTime          | <a href="#">DurationSeconds</a> | The maximum supported time for the list of points to be returned.                                                                                        |
| minTgtResolution | <a href="#">Distance</a>        | The minimum supported distance between reported path points. For implementations that do not support interpolation, the Min and Max should be identical. |
| pathType         | <a href="#">PathWayEnumType</a> | Path type.                                                                                                                                               |

### 6.2.93 PitchYNEDRequirement

**Namespace:** UMAA::Common::Orientation::PitchYNEDRequirement

**Description:** A requirement that specifies a pitch relative to the NED coordinate system.

**Table 490:** PitchYNEDRequirement Structure Definition

| Attribute Name | Attribute Type                     | Attribute Description                       |
|----------------|------------------------------------|---------------------------------------------|
| pitch          | <a href="#">PitchYNEDType</a>      | Defines a pitch relative to the NED system. |
| pitchTolerance | <a href="#">PitchYNEDTolerance</a> | Describes the pitch bounding limits.        |

### 6.2.94 PitchYNEDTolerance

**Namespace:** UMAA::Common::Orientation::PitchYNEDTolerance

**Description:** A down or up angle tolerance.

**Table 491:** PitchYNEDTolerance Structure Definition

| Attribute Name | Attribute Type                | Attribute Description                   |
|----------------|-------------------------------|-----------------------------------------|
| lowerlimit     | <a href="#">PitchYNEDType</a> | Defines the steepest downangle allowed. |
| upperlimit     | <a href="#">PitchYNEDType</a> | Defines the steepest upangle allowed.   |

### 6.2.95 PitchYNEDType

**Namespace:** UMAA::Common::Orientation::PitchYNEDType

**Description:** A requirement that specifies a pitch relative to the NED coordinate system.

**Table 492:** PitchYNEDType Structure Definition

| Attribute Name | Attribute Type                 | Attribute Description                                  |
|----------------|--------------------------------|--------------------------------------------------------|
| pitch          | <a href="#">PitchHalfAngle</a> | Defines a pitch relative to the NED coordinate system. |

### 6.2.96 Position2DLocalNED

**Namespace:** UMAA::Common::Measurement::Position2DLocalNED

**Description:** Specifies a two-dimensional location on a Cartesian coordinate system relative to the local coordinate system as defined within LocalPoseStatus.

**Table 493:** Position2DLocalNED Structure Definition

| Attribute Name | Attribute Type                | Attribute Description                                       |
|----------------|-------------------------------|-------------------------------------------------------------|
| eastAxis       | <a href="#">EastPosition</a>  | The east axis position in the local two dimensional plane.  |
| northAxis      | <a href="#">NorthPosition</a> | The north axis position in the local two dimensional plane. |

### 6.2.97 Position2DLocalNEDRequirement

**Namespace:** UMAA::Common::Position::Position2DLocalNEDRequirement

**Description:** Defines a position requirement.

**Table 494:** Position2DLocalNEDRequirement Structure Definition

| Attribute Name | Attribute Type                              | Attribute Description                      |
|----------------|---------------------------------------------|--------------------------------------------|
| tolerance†     | <a href="#">Position2DLocalNEDTolerance</a> | Specifies the required position tolerance. |
| value          | <a href="#">Position2DLocalNED</a>          | Specifies the required position.           |

### 6.2.98 Position2DLocalNEDTolerance

**Namespace:** UMAA::Common::Position::Position2DLocalNEDTolerance

**Description:** Defines a position tolerance.

**Table 495:** Position2DLocalNEDTolerance Structure Definition

| Attribute Name | Attribute Type           | Attribute Description                 |
|----------------|--------------------------|---------------------------------------|
| limit          | <a href="#">Distance</a> | Specifies the limit of the tolerance. |

### 6.2.99 Position3DBodyXYZ

**Namespace:** UMAA::Common::Measurement::Position3DBodyXYZ

**Description:** Specifies a three-dimensional location on a Cartesian coordinate system relative to the origin of the body.

**Table 496:** Position3DBodyXYZ Structure Definition

| Attribute Name | Attribute Type            | Attribute Description                                                                                                             |
|----------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| xAxis          | <a href="#">XPosition</a> | The position on the body x-axis, which extends out the front of the reference body.                                               |
| yAxis          | <a href="#">YPosition</a> | The position on the body y-axis, which extends out the right (starboard) of the reference body.                                   |
| zAxis          | <a href="#">ZPosition</a> | The position on the body z-axis, which is perpendicular to the x and y axes and is directed downward from the center of the body. |

### 6.2.100 PropellerPitchAnglePropulsorRequirement

**Namespace:** UMAA::Common::Requirements::PropellerPitchAnglePropulsorRequirement

**Description:** Describes the required pitch angle of the propulsor's propeller for propulsors with a variable angle propeller.

**Table 497:** PropellerPitchAnglePropulsorRequirement Structure Definition

| Attribute Name                        | Attribute Type                                        | Attribute Description                                      |
|---------------------------------------|-------------------------------------------------------|------------------------------------------------------------|
| propellerPitchAnglePropulsor          | <a href="#">PropellerPitchAnglePropulsor</a>          | Describes the required value of the propeller pitch angle. |
| propellerPitchAnglePropulsorTolerance | <a href="#">PropellerPitchAnglePropulsorTolerance</a> | Describes the required propeller pitch angle's tolerance.  |

### 6.2.101 PropellerPitchAnglePropulsorTolerance

**Namespace:** UMAA::Common::MeasurementTolerances::PropellerPitchAnglePropulsorTolerance

**Description:** Describes a tolerance range for the propeller pitch angle.

**Table 498:** PropellerPitchAnglePropulsorTolerance Structure Definition

| Attribute Name | Attribute Type                               | Attribute Description                                   |
|----------------|----------------------------------------------|---------------------------------------------------------|
| lowerLimit     | <a href="#">PropellerPitchAnglePropulsor</a> | Describes the lower limit of the propeller pitch angle. |
| upperLimit     | <a href="#">PropellerPitchAnglePropulsor</a> | Describes the upper limit of the propeller pitch angle. |

### 6.2.102 Quaternion

**Namespace:** BasicTypes::Quaternion

**Description:** Defines a four-element vector that can be used to encode any rotation in a 3D coordinate system.

**Table 499:** Quaternion Structure Definition

| Attribute Name | Attribute Type | Attribute Description |
|----------------|----------------|-----------------------|
| a              |                | Real number a.        |
| b              |                | Real number b.        |
| c              |                | Real number c.        |
| d              |                | Real number d.        |

### 6.2.103 RangeDataPointType

**Namespace:** UMAA::SA::RangeStatus::RangeDataPointType

**Description:** This structure is used to report data points identified by a range.

**Table 500:** RangeDataPointType Structure Definition

| Attribute Name  | Attribute Type          | Attribute Description                      |
|-----------------|-------------------------|--------------------------------------------|
| bearing         | <a href="#">Angle</a>   | Bearing from sensor.                       |
| bearingValidity | <a href="#">boolean</a> | True if bearing is valid; false otherwise. |

| Attribute Name       | Attribute Type                      | Attribute Description                          |
|----------------------|-------------------------------------|------------------------------------------------|
| dataPointCovariance† | <a href="#">CovariancePolarType</a> | Data point error covariance.                   |
| inclination          | <a href="#">Angle</a>               | Inclination from sensor.                       |
| inclinationValidity  | <a href="#">boolean</a>             | True if inclination is valid; false otherwise. |
| range                | <a href="#">Distance</a>            | Distance from sensor.                          |
| rangeValidity        | <a href="#">boolean</a>             | True if range is valid; false otherwise.       |
| pointID*             | <a href="#">NumericGUID</a>         | Unique ID of this point.                       |

#### 6.2.104 RangeErrorType

**Namespace:** UMAA::SEM::SensorManagement::RangeErrorType

**Description:** This structure is used to report error code when the specified range configuration is set to be invalid.

**Table 501:** RangeErrorType Structure Definition

| Attribute Name | Attribute Type                         | Attribute Description                                                           |
|----------------|----------------------------------------|---------------------------------------------------------------------------------|
| errorCode      | <a href="#">RangeErrorCodeEnumType</a> | Error code reports when the specified range configuration is set to be invalid. |
| errorMessage   | <a href="#">StringShortDescription</a> | A description of the invalid range configuration setting.                       |

#### 6.2.105 RecommendedSpeedControl

**Namespace:** UMAA::Common::Speed::RecommendedSpeedControl

**Description:** Defines the recommended speed mode.

**Table 502:** RecommendedSpeedControl Structure Definition

| Attribute Name          | Attribute Type                   | Attribute Description                 |
|-------------------------|----------------------------------|---------------------------------------|
| recommendedSpeedControl | <a href="#">SpeedControlType</a> | Specifies the recommended speed mode. |

#### 6.2.106 RequiredSpeedControl

**Namespace:** UMAA::Common::Speed::RequiredSpeedControl

**Description:** Defines the required speed mode.

**Table 503:** RequiredSpeedControl Structure Definition

| Attribute Name       | Attribute Type                   | Attribute Description              |
|----------------------|----------------------------------|------------------------------------|
| requiredSpeedControl | <a href="#">SpeedControlType</a> | Specifies the required speed mode. |

### 6.2.107 RetrotraversePolicyType

**Namespace:** UMAA::MM::CommsLostPolicy::RetrotraversePolicyType

**Description:** This structure is used to report the travel speed policy in case of lost communication of the vehicle.

**Table 504:** RetrotraversePolicyType Structure Definition

| Attribute Name      | Attribute Type                    | Attribute Description                                          |
|---------------------|-----------------------------------|----------------------------------------------------------------|
| retrotraversePolicy | <a href="#">RetrotraverseType</a> | Retrotraverse action policy while trying to regain comms.      |
| waypointPolicy†     | <a href="#">WaypointType</a>      | An optional travel to a waypoint while trying to regain comms. |

### 6.2.108 RetrotraverseType

**Namespace:** UMAA::MM::Retrotraverse::RetrotraverseType

**Description:** This structure is used to report the retrotraverse action of a vehicle.

**Table 505:** RetrotraverseType Structure Definition

| Attribute Name   | Attribute Type                                | Attribute Description                                                                                                                                                                                                                                     |
|------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| distance         | <a href="#">Distance</a>                      | Distance along the path to retrotraverse. In the case of retrotraverse to a point, this distance represents the maximum allowed overall travel distance; after this distance, the vehicle should stop even if the target point has not been achieved.     |
| maxSpeed         | <a href="#">Speed</a>                         | The maximum traversal speed. A value of zero means the vehicle should not exceed the speed of original travel.                                                                                                                                            |
| mode             | <a href="#">VehicleSpeedModeEnumType</a>      | A speed mode.                                                                                                                                                                                                                                             |
| speedReference   | <a href="#">VehicleSpeedReferenceEnumType</a> | A speed reference.                                                                                                                                                                                                                                        |
| standoffDistance | <a href="#">Distance</a>                      | Exclusion radius around the destination point. The vehicle may not approach closer than this distance.                                                                                                                                                    |
| travelDirection  | <a href="#">boolean</a>                       | This field defines the direction of motion used in retrotraverse. If the field is set, the vehicle will retrotraverse with positive velocity (conventional direction of travel). If the field is not set, the vehicle travel with negative velocity.      |
| travelMethod     | <a href="#">boolean</a>                       | When this field is set, the vehicle will travel along a straight line to a point on the originally traveled path that is X distance away from the current position, where X is specified in travelDirection. Otherwise, the vehicle will travel a path i. |

### 6.2.109 RhoAnglePropulsorRequirement

**Namespace:** UMAA::Common::Requirements::RhoAnglePropulsorRequirement

**Description:** Describes the required value of the propulsor's rho angle.

**Table 506:** RhoAnglePropulsorRequirement Structure Definition

| Attribute Name             | Attribute Type                             | Attribute Description                         |
|----------------------------|--------------------------------------------|-----------------------------------------------|
| rhoAnglePropulsor          | <a href="#">RhoAnglePropulsor</a>          | Describes the required rho value.             |
| rhoAnglePropulsorTolerance | <a href="#">RhoAnglePropulsorTolerance</a> | Describes the required rho value's tolerance. |

**6.2.110 RhoAnglePropulsorTolerance**

**Namespace:** UMAA::Common::MeasurementTolerances::RhoAnglePropulsorTolerance

**Description:** Describes a tolerance range for the required rho value.

**Table 507:** RhoAnglePropulsorTolerance Structure Definition

| Attribute Name | Attribute Type                    | Attribute Description      |
|----------------|-----------------------------------|----------------------------|
| lowerLimit     | <a href="#">RhoAnglePropulsor</a> | Describes the lower limit. |
| upperLimit     | <a href="#">RhoAnglePropulsor</a> | Describes the upper limit. |

**6.2.111 RollXNEDRequirement**

**Namespace:** UMAA::Common::Orientation::RollXNEDRequirement

**Description:** A requirement that specifies a roll relative to the NED coordinate system.

**Table 508:** RollXNEDRequirement Structure Definition

| Attribute Name | Attribute Type                    | Attribute Description                      |
|----------------|-----------------------------------|--------------------------------------------|
| roll           | <a href="#">RollXNEDType</a>      | Defines a roll relative to the NED system. |
| rollTolerance† | <a href="#">RollXNEDTolerance</a> | Describes the roll bounding limits.        |

**6.2.112 RollXNEDTolerance**

**Namespace:** UMAA::Common::Orientation::RollXNEDTolerance

**Description:** A rotational tolerance.

**Table 509:** RollXNEDTolerance Structure Definition

| Attribute Name | Attribute Type               | Attribute Description    |
|----------------|------------------------------|--------------------------|
| lowerlimit     | <a href="#">RollXNEDType</a> | Defines the lower bound. |
| upperlimit     | <a href="#">RollXNEDType</a> | Defines the lower bound. |

### 6.2.113 RollXNEDType

**Namespace:** UMAA::Common::Orientation::RollXNEDType

**Description:** A requirement that specifies a roll relative to the NED coordinate system.

**Table 510:** RollXNEDType Structure Definition

| Attribute Name | Attribute Type            | Attribute Description                                 |
|----------------|---------------------------|-------------------------------------------------------|
| roll           | <a href="#">RollAngle</a> | Defines a roll relative to the NED coordinate system. |

### 6.2.114 SpeedControlType

**Namespace:** UMAA::Common::Speed::SpeedControlType

**Description:** Union Type. Speed of the vehicle.

**Table 511:** SpeedControlType Union(s)

| Type Name                         | Type Description                 |
|-----------------------------------|----------------------------------|
| <a href="#">EngineRPM</a>         | Defines the engine RPM.          |
| <a href="#">SpeedOverGround</a>   | Defines the speed over ground.   |
| <a href="#">SpeedThroughAir</a>   | Defines the speed through air.   |
| <a href="#">SpeedThroughWater</a> | Defines the speed through water. |
| <a href="#">VehicleSpeedMode</a>  | Defines the speed mode.          |

### 6.2.115 SpeedOverGround

**Namespace:** UMAA::Common::Speed::SpeedOverGround

**Description:** Defines the speed over ground.

**Table 512:** SpeedOverGround Structure Definition

| Attribute Name | Attribute Type                         | Attribute Description        |
|----------------|----------------------------------------|------------------------------|
| speed          | <a href="#">GroundSpeedRequirement</a> | Specifies speed over ground. |

### 6.2.116 SpeedThroughAir

**Namespace:** UMAA::Common::Speed::SpeedThroughAir

**Description:** Defines the speed through air.

**Table 513:** SpeedThroughAir Structure Definition

| Attribute Name | Attribute Type                      | Attribute Description        |
|----------------|-------------------------------------|------------------------------|
| speed          | <a href="#">AirSpeedRequirement</a> | Specifies speed through air. |

### 6.2.117 SpeedThroughWater

**Namespace:** UMAA::Common::Speed::SpeedThroughWater

**Description:** Defines the speed through water.

**Table 514:** SpeedThroughWater Structure Definition

| Attribute Name | Attribute Type                        | Attribute Description          |
|----------------|---------------------------------------|--------------------------------|
| speed          | <a href="#">WaterSpeedRequirement</a> | Specifies speed through water. |

### 6.2.118 StationkeepStateType

**Namespace:** UMAA::MO::StationkeepState::StationkeepStateType

**Description: Union Type.** State of the station keeping being performed. While first transiting to the station keeping position, the selector will be StationkeepingTransitType until the station keep range and bearing to target are first achieved within their respective tolerances. Once achieved, the union selector will change to StationkeepingStationkeepType. The selector will not change as a result of any of the StationkeepingStationkeepType achievements states being lost and regained as a result of tolerance settings being violated. The service is expected to make driving adjustments to attempt to keep all achievement states satisfied. This is true until the service determines that tolerance(s) are violated by a sufficient margin that it is more effective for the vehicle to return to transiting to the station keeping position. In that case, the StationkeepStateType reverts to the StationkeepingTransitType selector and those transit achievements are then set.

**Table 515:** StationkeepStateType Union(s)

| Type Name                                     | Type Description                                                                          |
|-----------------------------------------------|-------------------------------------------------------------------------------------------|
| <a href="#">StationkeepingStationkeepType</a> | Indicates that the station keeping is currently executing.                                |
| <a href="#">TransitStationkeepType</a>        | Indicates that the vehicle is in transit to where the station keeping is to be performed. |

### 6.2.119 StationkeepingStationkeepType

**Namespace:** UMAA::MO::StationkeepState::StationkeepingStationkeepType

**Description:** Indicates that the station keeping is currently executing.

**Table 516:** StationkeepingStationkeepType Structure Definition

| Attribute Name           | Attribute Type | Attribute Description                                                                                                                                                                                             |
|--------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| bearingToContactAchieved | boolean        | When the station keeping is executing, this indicates that the contact bearing requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |
| elevationAchieved        | boolean        | Indicates that the elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.                                                   |
| rangeAchieved            | boolean        | When the station keeping is executing, this indicates that the range requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.           |

**6.2.120 StillImageErrorType**

**Namespace:** UMAA::SEM::SensorManagement::StillImageErrorType

**Description:** This structure is used to report error code when the specified still image configuration is set to be invalid.

**Table 517:** StillImageErrorType Structure Definition

| Attribute Name | Attribute Type              | Attribute Description                                                                 |
|----------------|-----------------------------|---------------------------------------------------------------------------------------|
| errorCode      | StillImageErrorCodeEnumType | Error code reports when the specified still image configuration is set to be invalid. |
| errorMessage   | StringShortDescription      | A description of the invalid still image configuration setting.                       |

**6.2.121 TimeWithSpeed**

**Namespace:** UMAA::Common::Speed::TimeWithSpeed

**Description:** Defines the time window and the recommended speed of a vehicle.

**Table 518:** TimeWithSpeed Structure Definition

| Attribute Name    | Attribute Type      | Attribute Description                            |
|-------------------|---------------------|--------------------------------------------------|
| arrivalTime       | DateTimeRequirement | Specifies the arrival time of the waypoint.      |
| recommendedSpeed† | SpeedControlType    | Specifies the recommended speed of the waypoint. |

**6.2.122 TransitStationkeepType**

**Namespace:** UMAA::MO::StationkeepState::TransitStationkeepType

**Description:** Indicates that the vehicle is in transit to where the station keeping is to be performed.

**Table 519:** TransitStationkeepType Structure Definition

| Attribute Name           | Attribute Type | Attribute Description                                                                                                                                                                            |
|--------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| transitElevationAchieved | boolean        | When in transit, this indicates whether the transit elevation requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute. |
| transitSpeedAchieved     | boolean        | When in transit, this indicates whether the transit speed requested is within the commanded tolerance. Achievement may be lost and regained resulting in multiple changes to this attribute.     |

**6.2.123 VariableSpeedControlType**

**Namespace:** UMAA::Common::Speed::VariableSpeedControlType

**Description: Union Type.** Speed specifier for the vehicle which may be based on explicit speed, a recommended speed, a time window, or a time window with an optional recommended speed.

**Table 520:** VariableSpeedControlType Union(s)

| Type Name               | Type Description                                                |
|-------------------------|-----------------------------------------------------------------|
| RecommendedSpeedControl | Defines the recommended speed mode.                             |
| RequiredSpeedControl    | Defines the required speed mode.                                |
| TimeWithSpeed           | Defines the time window and the recommended speed of a vehicle. |

**6.2.124 VehicleSpeedMode**

**Namespace:** UMAA::Common::Speed::VehicleSpeedMode

**Description:** Defines the speed mode.

**Table 521:** VehicleSpeedMode Structure Definition

| Attribute Name | Attribute Type           | Attribute Description     |
|----------------|--------------------------|---------------------------|
| mode           | VehicleSpeedModeEnumType | Specifies the speed mode. |

**6.2.125 Velocity3DPlatformNED**

**Namespace:** UMAA::Common::Measurement::Velocity3DPlatformNED

**Description:** Velocity3D\_PlatformNED specifies the velocity given by northing, easting and down vectors in a North-East-Down coordinate system centered on the platform.

**Table 522:** Velocity3DPlatformNED Structure Definition

| Attribute Name | Attribute Type             | Attribute Description                                                                                              |
|----------------|----------------------------|--------------------------------------------------------------------------------------------------------------------|
| downSpeed      | <a href="#">DownSpeed</a>  | downSpeed specifies the down velocity vector in a North-East-Down coordinate system centered on the platform.      |
| eastSpeed      | <a href="#">EastSpeed</a>  | eastSpeed specifies the easting velocity vector in a North-East-Down coordinate system centered on the platform.   |
| northSpeed     | <a href="#">NorthSpeed</a> | northSpeed specifies the northing velocity vector in a North-East-Down coordinate system centered on the platform. |

**6.2.126 VolumeBallastFlowRateType**

**Namespace:** UMAA::EO::BallastTank::VolumeBallastFlowRateType

**Description:** The desired flow rate to fill or empty the ballast pump measured by volume.

**Table 523:** VolumeBallastFlowRateType Structure Definition

| Attribute Name        | Attribute Type                     | Attribute Description                                                                 |
|-----------------------|------------------------------------|---------------------------------------------------------------------------------------|
| volumeBallastFlowRate | <a href="#">VolumetricFlowRate</a> | Specifies the desired flow rate to fill or empty the ballast pump measured by volume. |

**6.2.127 WaterSpeedRequirement**

**Namespace:** UMAA::Common::Speed::WaterSpeedRequirement

**Description:** Defines the speed through water.

**Table 524:** WaterSpeedRequirement Structure Definition

| Attribute Name | Attribute Type                      | Attribute Description                              |
|----------------|-------------------------------------|----------------------------------------------------|
| speed          | <a href="#">SpeedLocalWaterMass</a> | Specifies speed through water.                     |
| speedTolerance | <a href="#">WaterSpeedTolerance</a> | Specifies the tolerance for a speed through water. |

**6.2.128 WaterSpeedTolerance**

**Namespace:** UMAA::Common::Speed::WaterSpeedTolerance

**Description:** Defines the speed through water tolerance.

**Table 525:** WaterSpeedTolerance Structure Definition

| Attribute Name | Attribute Type                      | Attribute Description                                              |
|----------------|-------------------------------------|--------------------------------------------------------------------|
| lowerlimit     | <a href="#">SpeedLocalWaterMass</a> | Specifies the lower limit of allowable values for the water speed. |

| Attribute Name | Attribute Type                      | Attribute Description                                              |
|----------------|-------------------------------------|--------------------------------------------------------------------|
| upperlimit     | <a href="#">SpeedLocalWaterMass</a> | Specifies the upper limit of allowable values for the water speed. |

### 6.2.129 WaypointType

**Namespace:** UMAA::MM::BaseType::WaypointType

**Description:** This structure is used to define attributes of a waypoint including position, depth, and speed.

**Table 526:** WaypointType Structure Definition

| Attribute Name  | Attribute Type                              | Attribute Description                                                                            |
|-----------------|---------------------------------------------|--------------------------------------------------------------------------------------------------|
| attitude†       | <a href="#">Orientation3DNEDRequirement</a> | Describes the yaw, pitch, roll that the vehicle should assume as arriving at the given waypoint. |
| elevation†      | <a href="#">ElevationType</a>               | The optional elevation used for the vehicle.                                                     |
| name†           | <a href="#">StringShortDescription</a>      | A short name for the waypoint.                                                                   |
| position        | <a href="#">GeoPosition2DRequirement</a>    | Specifies the location of the waypoint.                                                          |
| speed†          | <a href="#">VariableSpeedControlType</a>    | Specifies the speed to be maintained traveling to the waypoint.                                  |
| trackTolerance† | <a href="#">Distance</a>                    | The current tolerance of the path measured by distance.                                          |
| waypointID*     | <a href="#">NumericGUID</a>                 | An unique identification of the waypoint.                                                        |

### 6.2.130 WhistlePropertiesType

**Namespace:** UMAA::Common::Propulsion::WhistlePropertiesType

**Description:** This structure is used to describe the properties of a signal whistle.

**Table 527:** WhistlePropertiesType Structure Definition

| Attribute Name | Attribute Type                    | Attribute Description                                                                       |
|----------------|-----------------------------------|---------------------------------------------------------------------------------------------|
| restTime       | <a href="#">TimeBetweenBlasts</a> | The time between blasts.                                                                    |
| whistleNumber  | <a href="#">PositiveCount</a>     | The number of times commanded to blast, if attribute is not included then it is continuous. |
| whistleType    | <a href="#">BlastKindEnumType</a> | Specifies the whistle type.                                                                 |

### 6.2.131 WorldTransformType

**Namespace:** UMAA::Common::Environment::WorldTransformType

**Description:** This is a base structure used to report the image-to-world transform according to the ESRI world file standard.

**Table 528:** WorldTransformType Structure Definition

| Attribute Name       | Attribute Type           | Attribute Description                                                                                                    |
|----------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------|
| pixelSizex           | <a href="#">Distance</a> | The pixel size in the x-direction in map units.                                                                          |
| pixelSizey           | <a href="#">Distance</a> | The pixel size in the y-direction in map units.                                                                          |
| rotationx            | <a href="#">Angle</a>    | The rotation about the x-axis.                                                                                           |
| rotationy            | <a href="#">Angle</a>    | The rotation about the y-axis.                                                                                           |
| upperLeftCoordinatex | <a href="#">Distance</a> | The x-coordinate of the center of the upper-left pixel of the image, given in the map frame.                             |
| upperLeftCoordinatey | <a href="#">Distance</a> | The y-coordinate of the center of the upper-left pixel of the image, given in the map frame and expressed as a negative. |

**6.2.132 YawZNEDRequirement**

**Namespace:** UMAA::Common::Orientation::YawZNEDRequirement

**Description:** A requirement that specifies a yaw relative to the NED coordinate system.

**Table 529:** YawZNEDRequirement Structure Definition

| Attribute Name | Attribute Type                   | Attribute Description                     |
|----------------|----------------------------------|-------------------------------------------|
| yaw            | <a href="#">YawZNEDType</a>      | Defines a yaw relative to the NED system. |
| yawTolerance†  | <a href="#">YawZNEDTolerance</a> | Describes the yaw bounding limits.        |

**6.2.133 YawZNEDTolerance**

**Namespace:** UMAA::Common::Orientation::YawZNEDTolerance

**Description:** A directional tolerance.

**Table 530:** YawZNEDTolerance Structure Definition

| Attribute Name | Attribute Type              | Attribute Description    |
|----------------|-----------------------------|--------------------------|
| lowerlimit     | <a href="#">YawZNEDType</a> | Defines the lower bound. |
| upperlimit     | <a href="#">YawZNEDType</a> | Defines the lower bound. |

**6.2.134 YawZNEDType**

**Namespace:** UMAA::Common::Orientation::YawZNEDType

**Description:** Specifies a yaw relative to the NED coordinate system.

**Table 531:** YawZNEDType Structure Definition

| Attribute Name | Attribute Type              | Attribute Description                                |
|----------------|-----------------------------|------------------------------------------------------|
| yaw            | <a href="#">YawPosAngle</a> | Defines a yaw relative to the NED coordinate system. |

## 6.3 Enumerations

Enumerations are used extensively throughout UMAA. This section lists the values associated with each enumeration defined in UCS-UMAA.

### 6.3.1 AnalogSensorErrorCodeEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::AnalogSensorErrorCodeEnumType

**Description:** A mutually exclusive set of values that defines the types of error reporting from the camera.

**Table 532:** AnalogSensorErrorCodeEnumType Enumeration

| Enumeration Value   | Description         |
|---------------------|---------------------|
| INVALID_FORMAT      | Invalid format      |
| UNKNOWN_ERROR_FAULT | Unknown error fault |
| UNKNOWN_SENSOR_ID   | Unknown sensor ID   |

### 6.3.2 AudioEncodingQualityEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::AudioEncodingQualityEnumType

**Description:** A mutually exclusive set of values that defines the types of audio encoding quality.

**Table 533:** AudioEncodingQualityEnumType Enumeration

| Enumeration Value | Description |
|-------------------|-------------|
| AVERAGE           | Average     |
| BEST              | Best        |
| BETTER            | Better      |
| GOOD              | Good        |
| LESS              | Less        |
| POOR              | Poor        |
| WORST             | Worst       |

### 6.3.3 AutomationEnumType

**Namespace:** UMAA::Common::Enumeration::AutomationEnumType

**Description:** A mutually exclusive set of values that defines automation modes that can be applied to devices and subsystems.

**Table 534:** AutomationEnumType Enumeration

| Enumeration Value | Description                                                     |
|-------------------|-----------------------------------------------------------------|
| AUTOMATIC         | Control over the corresponding element is completely automatic. |
| MANUAL            | Control over the corresponding element is completely manual.    |
| SEMI_AUTOMATIC    | Control over the corresponding element is semi-automatic.       |

### 6.3.4 BearingAngleEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::BearingAngleEnumType

**Description:** Defines a mutually exclusive set of values for the type of bearing angle.

**Table 535:** BearingAngleEnumType Enumeration

| Enumeration Value | Description                     |
|-------------------|---------------------------------|
| NORTH             | Angle is relative to true north |
| OWNSHIP           | Angle is relative to ownship    |

### 6.3.5 BilgeControlEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::BilgeControlEnumType

**Description:** A mutually exclusive set of values that defines the controlling mode of operation of each bilge pump on the vehicle.

**Table 536:** BilgeControlEnumType Enumeration

| Enumeration Value | Description                                                                                         |
|-------------------|-----------------------------------------------------------------------------------------------------|
| AUTO              | Bilge will automatically be turned on by the service when flood is detected in its responsible area |
| OFF               | Off                                                                                                 |
| ON                | On                                                                                                  |

### 6.3.6 BilgeStateEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::BilgeStateEnumType

**Description:** A mutually exclusive set of values that defines the states of each bilge pump on the vehicle.

**Table 537:** BilgeStateEnumType Enumeration

| Enumeration Value | Description |
|-------------------|-------------|
| FAULT             | Fault       |
| OFF               | Off         |
| ON                | On          |

### 6.3.7 BitDepthEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::BitDepthEnumType

**Description:** A mutually exclusive set of values that defines the types of bit depth.

**Table 538:** BitDepthEnumType Enumeration

| Enumeration Value | Description |
|-------------------|-------------|
| EIGHT_BITS        | 8 bit       |
| FIFTY_SIX_BITS    | 56 bit      |
| FOURTEEN_BITS     | 14 bit      |
| FOURTY_BITS       | 40 bit      |
| FOURTY_EIGHT_BITS | 48 bit      |
| SIXTEEN_BITS      | 16 bit      |
| SIXTY_FOUR_BITS   | 64 bit      |
| TEN_BITS          | 10 bit      |
| THIRTY_TWO_BITS   | 32 bit      |
| TWELVE_BITS       | 12 bit      |
| TWENTY_BITS       | 20 bit      |
| TWENTY_FOUR_BITS  | 24 bit      |

### 6.3.8 BlastConditionEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::BlastConditionEnumType

**Description:** A mutually exclusive set of values that defines the blast condition of a whistle, bell, or gong on board of the vehicle.

**Table 539:** BlastConditionEnumType Enumeration

| Enumeration Value | Description                                          |
|-------------------|------------------------------------------------------|
| BLASTING          | Vehicle whistle, bell, or gong is currently blasting |
| RESTING           | vehicle whistle, bell, or gong is currently resting  |

### 6.3.9 BlastKindEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::BlastKindEnumType

**Description:** A mutually exclusive set of values that defines duration of the blast of the annunciator such as whistle, bell, gong, etc. on board of the vehicle.

**Table 540:** BlastKindEnumType Enumeration

| Enumeration Value | Description                            |
|-------------------|----------------------------------------|
| LONG_BLAST        | Long blast, four to six seconds        |
| SHORT_BLAST       | Short blast, about one second duration |

### 6.3.10 BuiltInTestStatusEnumType

**Namespace:** UMAA::Common::Enumeration::BuiltInTestStatusEnumType

**Description:** A mutually exclusive set of values that defines the state of a Built-In Test.

**Table 541:** BuiltInTestStatusEnumType Enumeration

| Enumeration Value | Description                                         |
|-------------------|-----------------------------------------------------|
| BIT_FAILED        | The built-in test (BIT) has failed.                 |
| BIT_PASSED        | The built-in test (BIT) has passed.                 |
| BIT_SUSPENDED     | The built-in test (BIT) has been suspended.         |
| OFF_ABORT         | The built-in test (BIT) is off or has been aborted. |
| RUNNING_BIT       | The built-in test (BIT) is current executing.       |

### 6.3.11 CloudCoverEnumType

**Namespace:** UMAA::Common::OrderedEnumeration::CloudCoverEnumType

**Description:** A mutually exclusive set of values that defines a discrete set of cloud cover conditions.

**Table 542:** CloudCoverEnumType Enumeration

| Enumeration Value | Description                                                    |
|-------------------|----------------------------------------------------------------|
| BROKEN            | Cloud cover is from five-eighths to seven-eighths of the sky.  |
| CLEAR             | There are no clouds below 12,000 ft (zero-eighths of the sky). |
| FEW               | Cloud cover is from one-eighth to two-eighths of the sky.      |
| OVERCAST          | Cloud cover is complete (eight-eighths of the sky).            |
| SCATTERED         | Cloud cover is from three-eighths to four-eighths of the sky.  |

### 6.3.12 CollisionAvoidStateEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::CollisionAvoidStateEnumType

**Description:** A mutually exclusive set of values that defines the self-collision avoidance states supported by the vehicle.

**Table 543:** CollisionAvoidStateEnumType Enumeration

| Enumeration Value | Description                           |
|-------------------|---------------------------------------|
| DEVIATE_FROM_PATH | Deviate from path to avoid collisions |
| DO_NOTHING        | Do nothing                            |
| STOP_ON_PATH      | Stop on path                          |

### 6.3.13 CollisionAvoidStatusEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::CollisionAvoidStatusEnumType

**Description:** A mutually exclusive set of values that defines the self-collision avoidance current status supported by the vehicle.

**Table 544:** CollisionAvoidStatusEnumType Enumeration

| Enumeration Value       | Description              |
|-------------------------|--------------------------|
| ACTIVE_AVOID_OBSTACLE   | Active, avoid obstacle   |
| ACTIVE_STOP_ON_OBSTACLE | Active, stop on obstacle |
| DISABLED                | Disabled                 |
| ENABLED                 | Enabled                  |

### 6.3.14 CommandStatusReasonEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::CommandStatusReasonEnumType

**Description:** Defines a mutually exclusive set of reasons why a command status state transition has occurred.

**Table 545:** CommandStatusReasonEnumType Enumeration

| Enumeration Value | Description                                                                                                                                              |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| CANCELED          | Indicates a transition to the CANCELED state when the command is canceled successfully.                                                                  |
| INTERRUPTED       | Indicates a transition to the FAILED state when the command has been interrupted by a higher priority process.                                           |
| OBJECTIVE_FAILED  | Indicates a transition to the FAILED state when the commanded resource is unable to achieve the command's objective due to external factors.             |
| RESOURCE_FAILED   | Indicates a transition to the FAILED state when the commanded resource is unable to achieve the command's objective due to resource or platform failure. |
| RESOURCE_REJECTED | Indicates a transition to the FAILED state when the commanded resource rejects the command for some reason.                                              |
| SERVICE_FAILED    | Indicates a transition to the FAILED state when the commanded resource is unable to achieve the command's objective due to processing failure.           |
| SUCCEEDED         | Indicates the conditions to proceed to this state have been met and a normal state transition has occurred.                                              |
| TIMEOUT           | Indicates a transition to the FAILED state when the command is not acknowledged within some defined time bound.                                          |
| UPDATED           | Indicates a transition back to the ISSUED state from a non-terminal state when the command has been updated.                                             |
| VALIDATION_FAILED | Indicates a transition to the FAILED state when the command contains missing, out-of-bounds, or otherwise invalid parameters.                            |

### 6.3.15 CoordinateSystemEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::CoordinateSystemEnumType

**Description:** A mutually exclusive set of values that defines the coordinate system of the image data.

**Table 546:** CoordinateSystemEnumType Enumeration

| Enumeration Value         | Description                        |
|---------------------------|------------------------------------|
| SENSOR_COORDINATE_SYSTEM  | Sensor relative coordinate system  |
| VEHICLE_COORDINATE_SYSTEM | Vehicle relative coordinate system |

### 6.3.16 CoreStateEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::CoreStateEnumType

**Description:** A mutually exclusive set of values that defines the states of the systems, subsystems, or components.

**Table 547:** CoreStateEnumType Enumeration

| Enumeration Value | Description |
|-------------------|-------------|
| EMERGENCY         | Emergency   |
| FAILURE           | Failure     |
| INITIAL           | Initial     |
| READY             | Ready       |
| RESET             | Reset       |
| RESUME            | Resume      |
| SHUTDOWN          | Shutdown    |
| STANDBY           | Standby     |

### 6.3.17 DigitalAudioFormatEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::DigitalAudioFormatEnumType

**Description:** A mutually exclusive set of values that defines the types of digital audio format.

**Table 548:** DigitalAudioFormatEnumType Enumeration

| Enumeration Value | Description  |
|-------------------|--------------|
| AAC_MPEG2         | AAC_MPEG2    |
| AAC_MPEG4         | AAC_MPEG4    |
| AIFF              | AIFF         |
| ALAC              | ALAC         |
| DOLBY_DIGITAL     | DolbyDigital |
| DTS               | DTS          |
| FLAC              | FLAC         |
| LPCM_PCM          | LPCM_PCM     |
| MP2               | MP2          |
| MP3               | MP3          |
| REAL_AUDIO        | RealAudio    |

| Enumeration Value | Description                                 |
|-------------------|---------------------------------------------|
| SPEEX             | Speex                                       |
| TRUE_AUDIO        | TrueAudio                                   |
| ULAW              | uLaw (from DigitalAudioAnnunciator service) |
| VORBIS            | VORBIS                                      |
| WAV               | WAV                                         |
| WMA               | WMA                                         |
| WMA9_LOSS_LESS    | WMA9_LOSSLESS                               |

### 6.3.18 DigitalSensorErrorCodeEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::DigitalSensorErrorCodeEnumType

**Description:** A mutually exclusive set of values that defines the types of error reporting from the camera.

**Table 549:** DigitalSensorErrorCodeEnumType Enumeration

| Enumeration Value           | Description                 |
|-----------------------------|-----------------------------|
| INVALID_FORMAT              | Invalid format              |
| INVALID_FRAME_SIZE          | Invalid frame size          |
| INVALID_MAX_BIT_RATE        | Invalid maximum bit rate    |
| INVALID_MAX_FRAME_RATE      | Invalid maximum frame rate  |
| INVALID_MIN_BIT_RATE        | Invalid minimum bit rate    |
| INVALID_MIN_FRAME_RATE      | Invalid minimum frame rate  |
| MULTIPLE_INVALID_PARAMETERS | Multiple invalid parameters |
| UNKNOWN_ERROR_FAULT         | Unknown error fault         |
| UNKNOWN_SENSOR_ID           | Unknown sensor ID           |

### 6.3.19 DirectionModeEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::DirectionModeEnumType

**Description:** Specifies whether direction is a course or a based on the heading of the vehicle

**Table 550:** DirectionModeEnumType Enumeration

| Enumeration Value | Description                                            |
|-------------------|--------------------------------------------------------|
| COURSE            | Specifies that direction is the course of the vehicle  |
| HEADING           | Specifies that direction is the heading of the vehicle |

### 6.3.20 DomainEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::DomainEnumType

**Description:** A mutually exclusive set of values that defines the area or region in which a vehicle operates.

**Table 551:** DomainEnumType Enumeration

| Enumeration Value | Description     |
|-------------------|-----------------|
| AIR               | Air             |
| GROUND            | Surface, ground |
| SURFACE           | Surface, water  |
| UNDERSEA          | Undersea        |

### 6.3.21 EmitterOperationalStateEnumType

**Namespace:** UMAA::Common::Enumeration::EmitterOperationalStateEnumType

**Description:** Describes a mutually exclusive set of values that defines the status of devices capable of emitting a signal on a vehicle.

**Table 552:** EmitterOperationalStateEnumType Enumeration

| Enumeration Value    | Description                               |
|----------------------|-------------------------------------------|
| ALL_EMITTERS_OFF     | All emitters are turned off or disabled.  |
| EMISSIONS_RESTORED   | The state of emitters is restored.        |
| NOT_ALL_EMITTERS_OFF | Some emitters are turned off or disabled. |

### 6.3.22 EngineKindEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::EngineKindEnumType

**Description:** Defines a mutually exclusive set of values that defines the engine kind.

**Table 553:** EngineKindEnumType Enumeration

| Enumeration Value | Description      |
|-------------------|------------------|
| DIESEL            | A diesel engine. |
| GAS               | A gas engine.    |

### 6.3.23 ErrorConditionEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::ErrorConditionEnumType

**Description:** A mutually exclusive set of values that defines the error condition.

**Table 554:** ErrorConditionEnumType Enumeration

| Enumeration Value | Description                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------|
| ERROR             | An error condition is reported and expected to seriously compromise use of the reporting component or device. |
| FAIL              | An error condition is reported with severity indicating component or device failure.                          |
| INFO              | An error condition is reported, but impact on operation and performance is minimal.                           |
| NONE              | No error condition exists.                                                                                    |
| WARN              | An error condition is reported and expected to have significant impact on component or device performance.    |

### 6.3.24 ExposureModeEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::ExposureModeEnumType

**Description:** A mutually exclusive set of values that defines the exposure mode settings on the camera.

**Table 555:** ExposureModeEnumType Enumeration

| Enumeration Value | Description                              |
|-------------------|------------------------------------------|
| APETURE_PRIORITY  | Manual aperture, automatic shutter speed |
| AUTO_DEFAULT      | Auto default                             |
| MANUAL            | Manual                                   |
| SHUTTER_PRIORITY  | Manual shutter speed, automatic aperture |

### 6.3.25 FrameSizeEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::FrameSizeEnumType

**Description:** A mutually exclusive set of values that defines the resolution settings for the digital video frame that can be streamed down from the camera.

**Table 556:** FrameSizeEnumType Enumeration

| Enumeration Value | Description      |
|-------------------|------------------|
| CGA_320x200       | CGA_320x200      |
| CIF_1408x1152     | CIF_1408x1152    |
| CIF_352x288       | CIF_352x288      |
| CIF_704x576       | CIF_704x576      |
| EGA_640x350       | EGA_640x350      |
| HD1080_1920x1080  | HD1080_1920x1080 |
| HD480_852x480     | HD480_852x480    |
| HD720_1280x720    | HD720_1280x720   |
| HSXGA_5120x4096   | HSXGA_5120x4096  |
| QCIF_176x144      | QCIF_176x144     |

| Enumeration Value | Description      |
|-------------------|------------------|
| QQVGA_160x120     | QQVGA_160x120    |
| QSVGA_2560x2048   | QSVGA_2560x2048  |
| QVGA_320x240      | QVGA_320x240     |
| QXGA_2048x1536    | QXGA_2048x1536   |
| SQCIF_128x96      | SQCIF_128x96     |
| SVGA_800x600      | SVGA_800x600     |
| SXGA_1280x1024    | SXGA_1280x1024   |
| UXGA_1600x1200    | UXGA_1600x1200   |
| VGA_640x480       | VGA_640x480      |
| WHSXGA_6400x4096  | WHSXGA_6400x4096 |
| WHUXGA_7680x4800  | WHUXGA_7680x4800 |
| WOXGA_2560x1600   | WOXGA_2560x1600  |
| WQSVGA_3200x2048  | WQSVGA_3200x2048 |
| WQUXGA_3840x2400  | WQUXGA_3840x2400 |
| WSXGA_1600x1024   | WSXGA_1600x1024  |
| WUXGA_1920x1200   | WUXGA_1920x1200  |
| WVGA_852x480      | WVGA_852x480     |
| WXGA_1366x768     | WXGA_1366x768    |
| XGA_1024x768      | XGA_1024x768     |

### 6.3.26 GPSType

**Namespace:** UMAA::Common::MaritimeEnumeration::GPSType

**Description:** A mutually exclusive set of values that defines the command status of the GPSType.

**Table 557:** GPSType Enumeration

| Enumeration Value | Description        |
|-------------------|--------------------|
| INITIATING        | Initiating GPS Fix |
| PERFORMING        | Performing GPS Fix |
| STABLE            | Stable GPS Fix     |

### 6.3.27 GPSNavigationSolutionType

**Namespace:** UMAA::Common::MaritimeEnumeration::GPSNavigationSolutionType

**Description:** A mutually exclusive set of values that defines the navigation solution of the vehicle.

**Table 558:** GPSNavigationSolutionType Enumeration

| Enumeration Value | Description |
|-------------------|-------------|
| GPS_1             | GPS 1       |
| GPS_2             | GPS 2       |

| Enumeration Value | Description               |
|-------------------|---------------------------|
| GPS_2D            | GPS 2D                    |
| GPS_3             | GPS 3                     |
| GPS_3D            | GPS 3D                    |
| GPS_4             | GPS 4                     |
| GPS_DEAD_RECK     | GPS dead reckoning        |
| NO_NAV            | No navigation information |

### 6.3.28 GuardedTeleoperationStatusEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::GuardedTeleoperationStatusEnumType

**Description:** A mutually exclusive set of values that defines the status of the guarded teleoperation manager.

**Table 559:** GuardedTeleoperationStatusEnumType Enumeration

| Enumeration Value       | Description                                             |
|-------------------------|---------------------------------------------------------|
| ACTIVE_AVOID_OBSTACLE   | Vehicle has deviated from path to avoid obstacle        |
| ACTIVE_STOP_ON_OBSTACLE | Vehicle has stopped on path due to an obstacle          |
| DISABLED                | Disabled                                                |
| ENABLED                 | Enabled but not active                                  |
| PITCHOVER_LIMIT         | Vehicle has stopped because pitchover limit was reached |
| ROLLOVER_LIMIT          | Vehicle has stopped because rollover limit was reached  |

### 6.3.29 H264EncodingEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::H264EncodingEnumType

**Description:** A mutually exclusive set of values that defines different type of H264.

**Table 560:** H264EncodingEnumType Enumeration

| Enumeration Value    | Description          |
|----------------------|----------------------|
| BASELINE             | Baseline             |
| CAVLC444             | CAVLC 444            |
| CONSTRAINED_BASELINE | Constrained baseline |
| CONSTRAINED_HIGH     | Constrained high     |
| EXTENDED             | Extended             |
| HIGH                 | High                 |
| HIGH10               | High 10              |
| HIGH10_INTRA         | High 10 Intra        |
| HIGH422              | High 422             |
| HIGH422_INTRA        | High 422 Intra       |
| HIGH444_INTRA        | High 444 Intra       |
| HIGH444_PREDICTIVE   | High 444 predictive  |

| Enumeration Value             | Description                   |
|-------------------------------|-------------------------------|
| MAIN                          | Main                          |
| MULTIVIEW_HIGH                | Multiview high                |
| PROGRESSIVE_HIGH              | Progressive high              |
| SCALABLE_BASELINE             | Scalable baseline             |
| SCALABLE_CONSTRAINED_BASELINE | Scalable constrained baseline |
| SCALABLE_CONSTRAINED_HIGH     | Scalable constrained high     |
| SCALABLE_HIGH                 | Scalable high                 |
| SCALABLE_HIGH_INTRA           | Scalable high intra           |
| STEREO_HIGH                   | Stereo high                   |

### 6.3.30 H264PresetEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::H264PresetEnumType

**Description:** A mutually exclusive set of values that defines the preset type of H264.

**Table 561:** H264PresetEnumType Enumeration

| Enumeration Value  | Description        |
|--------------------|--------------------|
| BEST_QUALITY       | Best quality       |
| DRIVE_VISION       | Drive vision       |
| LOW_LATENCY        | Low latency        |
| MANIPULATION       | Manipulation       |
| PERSISTENT_STARE   | Persistent stare   |
| PROGRAM_SPECIFIC_1 | Program Specific 1 |
| PROGRAM_SPECIFIC_2 | Program Specific 2 |
| PROGRAM_SPECIFIC_3 | Program Specific 3 |
| PROGRAM_SPECIFIC_4 | Program Specific 4 |
| SLOW_COMMS         | Slow comms         |

### 6.3.31 HandoverResultEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::HandoverResultEnumType

**Description:** A mutually exclusive set of values that defines the status of the mode transition on a vehicle platform.

**Table 562:** HandoverResultEnumType Enumeration

| Enumeration Value | Description                                                 |
|-------------------|-------------------------------------------------------------|
| DEFERRED          | Control handover deferred temporarily by current controller |
| DENIED            | Control handover denied by current controller               |
| GRANTED           | Control handover granted by current controller              |

| Enumeration Value      | Description                                                                                   |
|------------------------|-----------------------------------------------------------------------------------------------|
| INSUFFICIENT_AUTHORITY | Control transfer requestor had insufficient authority to take control from current controller |
| NOT_AVAILABLE          | Vehicle is unavailable for control handover                                                   |
| TIMEOUT                | Control handover timed out because current controller did not respond in the allotted time    |

### 6.3.32 HeadingReferenceEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::HeadingReferenceEnumType

**Description:** Defines a mutually exclusive set of values for the heading reference angle.

**Table 563:** HeadingReferenceEnumType Enumeration

| Enumeration Value | Description                            |
|-------------------|----------------------------------------|
| CURRENT_DIRECTION | Angle is relative to current direction |
| MAGNETIC_NORTH    | Angle is relative to magnetic north    |
| TRUE_NORTH        | Angle is relative to true north        |
| WIND_DIRECTION    | Angle is relative to wind direction    |

### 6.3.33 HoverKindEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::HoverKindEnumType

**Description:** A mutually exclusive set of values that defines the hover priority of the vehicle.

**Table 564:** HoverKindEnumType Enumeration

| Enumeration Value | Description                                          |
|-------------------|------------------------------------------------------|
| LAT_LON_PRIORITY  | Prioritize maintaining a latitude/longitude position |
| Z_PRIORITY        | Prioritize maintaining an elevation                  |

### 6.3.34 IgnitionStateEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::IgnitionStateEnumType

**Description:** Defines a mutually exclusive set of values that defines the state of engine ignition.

**Table 565:** IgnitionStateEnumType Enumeration

| Enumeration Value | Description             |
|-------------------|-------------------------|
| OFF               | The engine is off.      |
| RUN               | The engine is running.  |
| START             | The engine is starting. |

### 6.3.35 ImageFormatEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::ImageFormatEnumType

**Description:** A mutually exclusive set of values that defines the image formats.

**Table 566:** ImageFormatEnumType Enumeration

| Enumeration Value | Description     |
|-------------------|-----------------|
| BMP               | BMP             |
| CR2_RAW           | CR2 (Canon RAW) |
| DNG               | DNG (Adobe RAW) |
| GIF               | GIF             |
| JPEG              | JPEG (default)  |
| NEF               | NEF (Nikon RAW) |
| PGM               | PGM             |
| PNG               | PNG             |
| PNM               | PNM             |
| PPM               | PPM             |
| TIFF              | TIFF            |

### 6.3.36 ImagingModeEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::ImagingModeEnumType

**Description:** A mutually exclusive set of values that defines intensity of image settings on the camera.

**Table 567:** ImagingModeEnumType Enumeration

| Enumeration Value | Description        |
|-------------------|--------------------|
| COLOR             | Default color mode |
| GREYSCALE         | Greyscale          |
| INFRARED          | Infrared           |
| LOWLIGHT          | Lowlight           |

### 6.3.37 IRPolarityEnumType

**Namespace:** UMAA::Common::Enumeration::IRPolarityEnumType

**Description:** A mutually exclusive set of values that defines the image polarity of an infrared sensor.

**Table 568:** IRPolarityEnumType Enumeration

| Enumeration Value | Description                                                                                 |
|-------------------|---------------------------------------------------------------------------------------------|
| BLACK_HOT         | In the infrared (IR) image, the black regions indicate hot and white regions indicate cool. |
| WHITE_HOT         | In the infrared (IR) image, the white regions indicate hot and black regions indicate cool. |

### 6.3.38 LightSensitivityEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::LightSensitivityEnumType

**Description:** A mutually exclusive set of values that defines the level of sensitivity of a camera to available light (ISO level).

**Table 569:** LightSensitivityEnumType Enumeration

| Enumeration Value | Description  |
|-------------------|--------------|
| AUTO_DEFAULT      | Auto default |
| ISO_100           | ISO 100      |
| ISO_1600          | ISO 1600     |
| ISO_200           | ISO 200      |
| ISO_3200          | ISO 3200     |
| ISO_400           | ISO 400      |
| ISO_800           | ISO 800      |

### 6.3.39 LostCommsStatusEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::LostCommsStatusEnumType

**Description:** A mutually exclusive set of values that defines the lost communications policy status of the vehicle.

**Table 570:** LostCommsStatusEnumType Enumeration

| Enumeration Value | Description |
|-------------------|-------------|
| ACTIVE            | Active      |
| DISABLED          | Disabled    |
| ENABLED           | Enabled     |

### 6.3.40 CommandStatusEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::CommandStatusEnumType

**Description:** Defines a mutually exclusive set of values that defines the states of a command as it progresses towards completion.

**Table 571:** CommandStatusEnumType Enumeration

| Enumeration Value | Description                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------|
| CANCELED          | The command was canceled by the requestor before the command completed successfully.                                        |
| COMMANDED         | The command has been placed in the resource's command queue but has not yet been accepted.                                  |
| COMPLETED         | The command has been completed successfully.                                                                                |
| EXECUTING         | The command is being performed by the resource and has not yet been completed.                                              |
| FAILED            | The command has been attempted, but was not successful.                                                                     |
| ISSUED            | The command has been issued to the resource (typically a sensor or streaming device), but processing has not yet commenced. |

### 6.3.41 DataEncodingEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::DataEncodingEnumType

**Description:** A mutually exclusive set of values that defines the types of specialized format used for encoding an elementary data stream within a transport stream.

**Table 572:** DataEncodingEnumType Enumeration

| Enumeration Value | Description |
|-------------------|-------------|
| AVI               | AVI         |
| H_261             | H.261       |
| H_262             | H.262       |
| H_263             | H.263       |
| H_263PLUS         | H.263 Plus  |
| H_264             | H.264       |
| MJPEG             | MJPEG       |
| MPEG_1            | MPEG-1      |
| MPEG_2            | MPEG-2      |
| MPEG_4            | MPEG-4      |
| NONE              | None        |

### 6.3.42 TransportEncodingEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::TransportEncodingEnumType

**Description:** A mutually exclusive set of values that defines the encoding methods used for video transport.

**Table 573:** TransportEncodingEnumType Enumeration

| Enumeration Value | Description |
|-------------------|-------------|
| MP4               | MPEG-4      |
| MPEG_2            | MPEG-2      |

| Enumeration Value | Description                   |
|-------------------|-------------------------------|
| OTHER             | Unspecified or unknown format |

### 6.3.43 MeteringModeEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::MeteringModeEnumType

**Description:** A mutually exclusive set of values that defines the metering mode settings on the camera.

**Table 574:** MeteringModeEnumType Enumeration

| Enumeration Value | Description     |
|-------------------|-----------------|
| AUTO_DEFAULT      | Auto default    |
| CENTER_WEIGHTED   | Center weighted |
| SPOT              | Spot            |

### 6.3.44 NavigationRulesEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::NavigationRulesEnumType

**Description:** Defines a mutually exclusive set of values that defines the current navigation rules under which the vehicle is operating.

**Table 575:** NavigationRulesEnumType Enumeration

| Enumeration Value | Description                                                                                                                                                       |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| INLAND            | The vehicle is operating upon the inland waters of the United States or on the Canadian waters of the Great Lakes (See Navigation Rules and Regulations Handbook) |
| INTERNATIONAL     | The vehicle is operating upon any waters outside of established navigational lines of demarcation (See Navigation Rules and Regulations Handbook)                 |

### 6.3.45 NetworkProtocolEnumType

**Namespace:** UMAA::Common::Enumeration::NetworkProtocolEnumType

**Description:** A mutually exclusive set of values that defines network protocols.

**Table 576:** NetworkProtocolEnumType Enumeration

| Enumeration Value | Description                                                                                                                                                                                     |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TCP_IPV4          | The network protocol is transmission control protocol (TCP) internet protocol (IP) version 4. This is a reliable, connection based protocol that uses four octets to specify network addresses. |
| TCP_IPV6          | The network protocol is transmission control protocol (TCP) internet protocol (IP) version 6. This is a reliable, connection based protocol that uses 128-bits to specify network addresses.    |

| Enumeration Value | Description                                                                                                                                                                               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UDP_IPV4          | The network protocol is user datagram protocol (UDP) internet protocol (IP) version 4. This is an unreliable, connectionless protocol that uses four octets to specify network addresses. |
| UDP_IPV6          | The network protocol is user datagram protocol (UDP) internet protocol (IP) version 4. This is an unreliable, connectionless protocol that uses four octets to specify network addresses. |

### 6.3.46 ObstacleAvoidanceEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::ObstacleAvoidanceEnumType

**Description:** A mutually exclusive set of values that defines the obstacle avoidance policy of a given vehicle.

**Table 577:** ObstacleAvoidanceEnumType Enumeration

| Enumeration Value | Description                          |
|-------------------|--------------------------------------|
| DEVIATE_FROM_PATH | Deviate from path to avoid obstacle  |
| DO_NOTHING        | Do not try to avoid obstacle         |
| STOP_ON_PATH      | Stop on path before hitting obstacle |

### 6.3.47 OnOffStatusEnumType

**Namespace:** UMAA::Common::Enumeration::OnOffStatusEnumType

**Description:** A mutually exclusive set of values that defines the on/off status of a device or subsystem.

**Table 578:** OnOffStatusEnumType Enumeration

| Enumeration Value | Description                     |
|-------------------|---------------------------------|
| OFF               | The device or subsystem is off. |
| ON                | The device or subsystem is on.  |

### 6.3.48 PathWayEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::PathWayEnumType

**Description:** A mutually exclusive set of values that defines the different types of path.

**Table 579:** PathWayEnumType Enumeration

| Enumeration Value | Description            |
|-------------------|------------------------|
| HISTORICAL_GLOBAL | Historical global path |
| HISTORICAL_LOCAL  | Historical local path  |
| PLANNED_GLOBAL    | Planned global path    |
| PLANNED_LOCAL     | Planned local path     |

### 6.3.49 PlanActionEnumType

**Namespace:** UMAA::Common::Enumeration::PlanActionEnumType

**Description:** A mutually exclusive set of values that defines types of actions for plan maintenance and management.

**Table 580:** PlanActionEnumType Enumeration

| Enumeration Value       | Description                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------|
| ABORT_MISSION_LOAD_PLAN | The current mission should be aborted and the specified plan loaded in its place.                 |
| ADD_PLAN                | The specified plan should be added to the mission plan repository.                                |
| DELETE_PLAN             | The specified plan should be deleted from the mission plan repository.                            |
| DOWNLOAD_PLAN           | The specified plan should be downloaded from the unmanned vehicle to the mission plan repository. |
| RETRIEVE_PLAN           | The specified plan should be retrieved from the mission plan repository.                          |
| UPDATE_PLAN             | The specified plan should be updated in the mission plan repository.                              |
| UPLOAD_PLAN             | The specified plan should be uploaded to the unmanned vehicle.                                    |

### 6.3.50 PlatformModeEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::PlatformModeEnumType

**Description:** A mutually exclusive set of values that defines the mode of a vehicle platform.

**Table 581:** PlatformModeEnumType Enumeration

| Enumeration Value  | Description        |
|--------------------|--------------------|
| MAINTENANCE        | Maintenance        |
| STANDARD_OPERATING | Standard_Operating |
| TRAINING           | Training           |

### 6.3.51 PlatformModeTransitionEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::PlatformModeTransitionEnumType

**Description:** A mutually exclusive set of values that defines the status of the mode transition on a vehicle platform.

**Table 582:** PlatformModeTransitionEnumType Enumeration

| Enumeration Value | Description  |
|-------------------|--------------|
| ACTIVE            | Active       |
| EXITING           | Exiting      |
| INITIALIZING      | Initializing |

### 6.3.52 PowerPlantStateEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::PowerPlantStateEnumType

**Description:** A mutually exclusive set of values that defines the power state of each power plant on the vehicle.

**Table 583:** PowerPlantStateEnumType Enumeration

| Enumeration Value | Description |
|-------------------|-------------|
| FAULT             | Faulted     |
| OFF               | Off         |
| ON                | On          |

### 6.3.53 PowerStatusEnumType

**Namespace:** UMAA::Common::Enumeration::PowerStatusEnumType

**Description:** A mutually exclusive set of values that defines the power state or status of device or subsystem

**Table 584:** PowerStatusEnumType Enumeration

| Enumeration Value | Description                                                        |
|-------------------|--------------------------------------------------------------------|
| EMERGENCY_POWER   | Power for the device is requested/reported to use emergency power. |
| POWER_OFF         | Power for the device is requested/reported to be off.              |
| POWER_ON          | Power for the device is requested/reported to be on.               |
| POWER_STANDBY     | Power for the device is requested/reported to use standby power.   |

### 6.3.54 PrecipitationEnumType

**Namespace:** UMAA::Common::Enumeration::PrecipitationEnumType

**Description:** A mutually exclusive set of values that defines types of precipitation.

**Table 585:** PrecipitationEnumType Enumeration

| Enumeration Value | Description                                                                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DRIZZLE           | Precipitation that consists of numerous minute droplets of water less than 0.5 mm in diameter that reach the Earth's surface.                                               |
| FOG               | Fog is water droplets suspended in the air at or above the Earth's surface.                                                                                                 |
| HAZE              | Haze is an aggregation in the atmosphere of very fine, widely dispersed, solid or liquid particles, or both, giving the air an opalescent appearance that subdues colors.   |
| RAIN              | Precipitation that falls to earth in droplets of water more than 0.5 mm in diameter.                                                                                        |
| SHOWERS           | Rain that falls intermittently over a small area. The rain from an individual shower can be heavy or light, but doesn't cover a large area or last more than an hour or so. |
| SNOW              | Precipitation in the form of ice crystals formed directly from the freezing [deposition] of the water vapor in the air.                                                     |

| Enumeration Value | Description                                                                                                                                                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| THUNDERSTORMS     | A rain or snow shower in which there is lightning. Thunder is always caused by lightning. In general, the upward and downward winds, updrafts and down-drafts, in thunderstorms are more violent than those in ordinary showers. |

### 6.3.55 PumpStateEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::PumpStateEnumType

**Description:** A mutually exclusive set of values that defines the mode of operation of each pump on the vehicle.

**Table 586:** PumpStateEnumType Enumeration

| Enumeration Value | Description               |
|-------------------|---------------------------|
| FAULT             | Faulted                   |
| OFF               | Off                       |
| ON_FORWARD        | Running forward direction |
| ON_REVERSE        | Running reverse direction |

### 6.3.56 RangeErrorCodeEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::RangeErrorCodeEnumType

**Description:** A mutually exclusive set of values that defines the types of error reporting from proximity sensors onboard or offboard of the vehicle.

**Table 587:** RangeErrorCodeEnumType Enumeration

| Enumeration Value           | Description                 |
|-----------------------------|-----------------------------|
| INVALID_HORIZONTAL_FOV      | Invalid horizontal FOV      |
| INVALID_SENSOR_RANGE        | Invalid sensor range        |
| INVALID_SENSOR_STATE        | Invalid sensor state        |
| INVALID_UPDATE_RATE         | Invalid update rate         |
| INVALID_VERTICAL_FOV        | Invalid vertical FOV        |
| MULTIPLE_INVALID_PARAMETERS | Multiple invalid parameters |
| UNKNOWN_ERROR_FAULT         | Unknown error fault         |
| UNKNOWN_SENSOR_ID           | Unknown sensor ID           |

### 6.3.57 RenderUselessStateEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::RenderUselessStateEnumType

**Description:** A mutually exclusive set of values that defines the render states of the target system or subsystem.

**Table 588:** RenderUselessStateEnumType Enumeration

| Enumeration Value       | Description           |
|-------------------------|-----------------------|
| NORMAL                  | Normal                |
| RENDERED_USELESS        | Rendered Useless      |
| RENDERED_USELESS_FAILED | Render Useless Failed |

**6.3.58 ResourceAllocationStatusEnumType**

**Namespace:** UMAA::Common::Enumeration::ResourceAllocationStatusEnumType

**Description:** A mutually exclusive set of values that defines allocation status for domain resources.

**Table 589:** ResourceAllocationStatusEnumType Enumeration

| Enumeration Value                   | Description                                                 |
|-------------------------------------|-------------------------------------------------------------|
| ALLOCATED                           | The resource is allocated.                                  |
| ALLOCATED_W_LAUNCH_RECOVERY         | The resource is allocated with launch and recovery.         |
| AVAILABLE                           | The resource is available.                                  |
| FAULT                               | There was a fault in the resource allocation.               |
| FORCED_ALLOCATION                   | The resource allocation is forced.                          |
| FORCED_ALLOCATION_W_LAUNCH_RECOVERY | The resource allocation with launch and recovery is forced. |
| RELEASED                            | The resource is released.                                   |
| TEMPORARILY_UNAVAILABLE             | The resource is temporarily unavailable.                    |
| UNAVAILABLE                         | The resource is unavailable.                                |

**6.3.59 SpecificLOIEnumType**

**Namespace:** UMAA::Common::Enumeration::SpecificLOIEnumType

**Description:** A mutually exclusive set of values that defines the Level Of Interoperability (LOI) of a UCS system.

**Table 590:** SpecificLOIEnumType Enumeration

| Enumeration Value | Description                                                                                                                                                                                  |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LOI_1             | The data link level of interoperability (LOI)-1 is indirect receipt of UAV related data.                                                                                                     |
| LOI_2             | The data link level of interoperability (LOI)-2 is direct receipt of ISR or other data where "direct" covers reception of UAV data by the UCS when it has direct communication with the UAV. |
| LOI_3             | The data link level of interoperability (LOI)-3 is control and monitoring of the UAV payload in addition to direct receipt of ISR or other data.                                             |
| LOI_4             | The data link level of interoperability (LOI)-4 is control and monitoring of the UAV, less launch and recovery.                                                                              |
| LOI_5             | The data link level of interoperability (LOI)-5 is control and monitoring of the UAV (LOI-4) plus launch and recovery functions.                                                             |

### 6.3.60 StillImageErrorCodeEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::StillImageErrorCodeEnumType

**Description:** A mutually exclusive set of values that defines the types of error reporting from the camera.

**Table 591:** StillImageErrorCodeEnumType Enumeration

| Enumeration Value           | Description                 |
|-----------------------------|-----------------------------|
| INVALID_FORMAT              | Invalid format              |
| INVALID_FRAME_SIZE          | Invalid frame size          |
| MULTIPLE_INVALID_PARAMETERS | Multiple invalid parameters |
| UNKNOWN_ERROR_FAULT         | Unknown error fault         |
| UNKNOWN_SENSOR_ID           | Unknown sensor ID           |

### 6.3.61 StreamStateEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::StreamStateEnumType

**Description:** A mutually exclusive set of values that defines the playback state of the video stream.

**Table 592:** StreamStateEnumType Enumeration

| Enumeration Value | Description |
|-------------------|-------------|
| PAUSE             | Paused      |
| PLAY              | Playing     |
| STOP              | Stopped     |

### 6.3.62 TamperDetectionStateEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::TamperDetectionStateEnumType

**Description:** A mutually exclusive set of values that defines the state of tamper detection.

**Table 593:** TamperDetectionStateEnumType Enumeration

| Enumeration Value       | Description                                                                   |
|-------------------------|-------------------------------------------------------------------------------|
| ALWAYS_ENABLED_OR_CLEAR | ALWAYS_ENABLED for reporting data; CLEAR for clearing the previous activities |
| DISABLED                | Disabled                                                                      |
| ENABLED                 | Enabled                                                                       |

**6.3.63 TrackCategoryEnumType****Namespace:** UMAA::Common::MaritimeEnumeration::TrackCategoryEnumType**Description:** Defines a mutually exclusive set of values that indicates the type of track, by category**Table 594:** TrackCategoryEnumType Enumeration

| Enumeration Value            | Description              |
|------------------------------|--------------------------|
| ADS_B_DIRECTIONAL_AIR        | Definition to be defined |
| ADS_B_DIRECTIONAL_SURFACE    | Definition to be defined |
| ADS_B_NONDIRECTIONAL_AIR     | Definition to be defined |
| ADS_B_NONDIRECTIONAL_SURFACE | Definition to be defined |
| AIR                          | Air                      |
| ASW                          | Definition to be defined |
| EMERGENCY                    | Emergency                |
| EW                           | Definition to be defined |
| LAND_POINT                   | Land Point               |
| LAND_TRACK                   | Land Track               |
| MP_AREA                      | Definition to be defined |
| MP_LINE                      | Definition to be defined |
| NA                           | Definition to be defined |
| NO_STATEMENT                 | Definition to be defined |
| POINTER                      | Definition to be defined |
| REF_POINT                    | Definition to be defined |
| SP_AREA                      | Definition to be defined |
| SPACE                        | Space                    |
| SUB_SURFACE                  | Below the surface        |
| SURFACE                      | Surface                  |

**6.3.64 TrackIdentityEnumType****Namespace:** UMAA::Common::MaritimeEnumeration::TrackIdentityEnumType**Description:** Defines a mutually exclusive set of values that defines the current identity of the contact track.**Table 595:** TrackIdentityEnumType Enumeration

| Enumeration Value | Description                                                                                                                         |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| ASSUMED_FRIEND    | A track which is assumed to be a friend because of its characteristics, behavior, or origin                                         |
| FAKER             | A friendly track acting as a "suspect" track for exercise purposes only                                                             |
| FRIEND            | A track belonging to a declared friendly nation                                                                                     |
| HOSTILE           | A track which is eligible to be engaged                                                                                             |
| JOKER             | A friendly track acting as a "hostile" track for exercise purposes only                                                             |
| NEUTRAL           | A track whose characteristics, behavior, origin, or nationality indicate that it is neither supporting nor opposing friendly forces |

| Enumeration Value | Description                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------|
| PENDING           | A track for which identification is to be determined                                                 |
| SUSPECT           | A track which is potentially hostile because of its characteristics, behavior, origin or nationality |
| UNKNOWN           | An evaluated track which has not been identified                                                     |

### 6.3.65 VehicleSituationalSignalEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::VehicleSituationalSignalEnumType

**Description:** Defines a mutually exclusive set of values that defines the component to emit one or a combination of signals as recommended in COLREGs.

**Table 596:** VehicleSituationalSignalEnumType Enumeration

| Enumeration Value                             | Description                                                         |
|-----------------------------------------------|---------------------------------------------------------------------|
| ENGAGED_IN_MINE_CLEARANCE_OPERATIONS          | Engaged in mine clearance operations signal active status.          |
| MANEUVERABILITY_RESTRICTED                    | Maneuverability restricted signal active status.                    |
| TOWING_ALONGSIDE_OR_PUSHING_AHEAD             | Towing and pushing alongside or ahead signal active status.         |
| VEHICLE_AGROUND                               | Aground signal active status.                                       |
| VEHICLE_ANCHORED                              | Anchored signal active status.                                      |
| VEHICLE_BEING_PUSHED_AHEAD_OR_TOWED_ALONGSIDE | Vehicle being pushed ahead or towed alongside signal active status. |
| VEHICLE_BEING_TOWED_ASTEARN                   | Vehicle being towed astern signal active status.                    |
| VEHICLE_CONSTRAINED_BY_HER_DRAFT              | Constrained by her draft signal active status.                      |
| VEHICLE_NOT_UNDER_CONTROL                     | Not under control signal active status.                             |
| VEHICLE_TOWING_ASTEARN_GREATER_THAN_200_M     | Towing greater than 200M astern active status.                      |
| VEHICLE_TOWING_ASTEARN_LESS_THAN_200_M        | Towing less than 200M astern active status.                         |
| VEHICLE_UNDERWAY                              | Underway signal active status.                                      |

### 6.3.66 VehicleSpeedModeEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::VehicleSpeedModeEnumType

**Description:** A mutually exclusive set of values that defines the type of performance speed of the vehicle.

**Table 597:** VehicleSpeedModeEnumType Enumeration

| Enumeration Value | Description                                                                                                                                                                                                                                                                    |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LRC               | Long Range Cruise. A speed that optimizes time, distance and fuel consumption for a vehicle (definition of "optimized" is subjective. Example: for a planing hull, this is usually the minimum planing speed, even though lower speeds can achieve longer endurance or range.) |
| MEC               | Maximum Endurance Cruise. The speed that maximizes the time a vehicle can travel.                                                                                                                                                                                              |
| MRC               | Maximum Range Cruise. The speed that maximizes the distance a vehicle can travel.                                                                                                                                                                                              |
| SLOW              | Slow speed. Minimum speed at which the vehicle can operate (definition of "operate" is subjective. Example: minimum speed to achieve maneuverability, engine idle speed/gear clutched in "idle ahead", etc.)                                                                   |
| VEHICLE_SPECIFIC  | Preset speed for the vehicle, that is in the range of speeds for the subject vehicle                                                                                                                                                                                           |

**6.3.67 VehicleSpeedReferenceEnumType**

**Namespace:** UMAA::Common::MaritimeEnumeration::VehicleSpeedReferenceEnumType

**Description:** A mutually exclusive set of values that defines the type of referenced speed of the vehicle.

**Table 598:** VehicleSpeedReferenceEnumType Enumeration

| Enumeration Value   | Description                         |
|---------------------|-------------------------------------|
| OTHER               | Other                               |
| RPM                 | RPM                                 |
| SPEED_OVER_GROUND   | Speed relative to ground            |
| SPEED_THROUGH_AIR   | Air speed                           |
| SPEED_THROUGH_WATER | Speed relative to surrounding water |

**6.3.68 VideoFormatEnumType**

**Namespace:** UMAA::Common::MaritimeEnumeration::VideoFormatEnumType

**Description:** A mutually exclusive set of values that defines the video formats.

**Table 599:** VideoFormatEnumType Enumeration

| Enumeration Value | Description      |
|-------------------|------------------|
| NTSCJ             | NTSC-J           |
| NTSCM             | NTSC-M (default) |
| PALM              | PAL-M            |
| PALN              | PAL-N            |
| SECAMBG           | SECAM-B/G        |
| SECAML            | SECAM-L          |

### 6.3.69 WaterTurnDirectionEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::WaterTurnDirectionEnumType

**Description:** A mutually exclusive set of values that define the types of turn directions applied by the vehicle during turns.

**Table 600:** WaterTurnDirectionEnumType Enumeration

| Enumeration Value | Description                        |
|-------------------|------------------------------------|
| LEFT_TURN         | The vehicle will make left turns.  |
| RIGHT_TURN        | The vehicle will make right turns. |

### 6.3.70 WeatherSeverityEnumType

**Namespace:** UMAA::Common::OrderedEnumeration::WeatherSeverityEnumType

**Description:** A mutually exclusive set of values that defines classification levels for severe weather conditions.

**Table 601:** WeatherSeverityEnumType Enumeration

| Enumeration Value | Description                                  |
|-------------------|----------------------------------------------|
| EXTREME           | The adverse weather conditions are extreme.  |
| LIGHT             | The adverse weather conditions are light.    |
| MODERATE          | The adverse weather conditions are moderate. |
| NONE              | There is no adverse weather.                 |
| SEVERE            | The adverse weather conditions are severe.   |

### 6.3.71 WhiteBalanceEnumType

**Namespace:** UMAA::Common::MaritimeEnumeration::WhiteBalanceEnumType

**Description:** A mutually exclusive set of values that defines the white balance settings on the camera.

**Table 602:** WhiteBalanceEnumType Enumeration

| Enumeration Value | Description  |
|-------------------|--------------|
| AUTO_DEFAULT      | Auto default |
| CLOUDY            | Cloudy       |
| DAYLIGHT          | Daylight     |
| FLASH             | Flash        |
| FLUORESCENT       | Fluorescent  |
| SHADE             | Shade        |
| TUNGSTEN          | Tungsten     |

**6.3.72 ZoomModeEnumType**

**Namespace:** UMAA::Common::MaritimeEnumeration::ZoomModeEnumType

**Description:** A mutually exclusive set of values that defines the operational mode of camera.

**Table 603:** ZoomModeEnumType Enumeration

| Enumeration Value | Description                                       |
|-------------------|---------------------------------------------------|
| ANALOG_ONLY       | Analog zoom only                                  |
| DIGITAL_ONLY      | Digital zoom only                                 |
| MIXED_DEFAULT     | System default mixture of analog and digital zoom |
| OFF               | No zoom                                           |

## 6.4 Type Definitions

This section describes the type definitions for UMAA. The table below lists how UMAA defined types are mapped to the DDS primitive types.

**Table 604:** Type Definitions

| Type Name                | Primitive Type | Range of Values                                                                                                                                                          | Description                                                                                                                                                                      |
|--------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AccelerationScalar       | double         | fractionDigits=3<br>maxInclusive=1310.68<br>minInclusive=-1310.68<br>units=MeterPerSecondSquared<br>referenceFrame=Counting                                              | This type stores acceleration in m/s/s.                                                                                                                                          |
| AirTemperature           | double         | fractionDigits=3<br>maxInclusive=100<br>minInclusive=-100<br>units=Celsius                                                                                               | Specifies the air temperature.                                                                                                                                                   |
| Angle                    | double         | fractionDigits=3<br>maxInclusive=3.141592653589<br>7932384626433832795<br>minInclusive=-3.141592653589<br>7931264626433832795<br>units=Radian<br>referenceFrame=Counting | Specifies the amount of turning necessary to bring one ray, line or plane into coincidence with or parallel to another. The measurement is stated in radians between -pi and pi. |
| AngleAcceleration        | double         | fractionDigits=3<br>maxInclusive=N/A<br>minInclusive=N/A<br>units=RadianPerSecondSquared<br>referenceFrame=PlatformXYZ                                                   | Represents the rate of change of angular velocity measured in radians per second squared.                                                                                        |
| AnglePosition            | double         | fractionDigits=3<br>maxInclusive=100<br>minInclusive=-100<br>units=Radian<br>referenceFrame=PlatformXYZ                                                                  | Represents the position angle measured in percent.                                                                                                                               |
| AngleRate                | double         | fractionDigits=3<br>maxInclusive=62.831<br>minInclusive=-62.831<br>units=RadianPerSecond<br>referenceFrame=Counting                                                      | Represents the rate of change of angular displacement measured in radians per second.                                                                                            |
| ApertureDiameter         | double         | fractionDigits=6<br>maxInclusive=N/A<br>minInclusive=0<br>units=Millimeter                                                                                               | Measures the diameter of a main lens or mirror that gathers light to a focus.                                                                                                    |
| AzimuthTrueNorthPosAngle | double         | fractionDigits=3<br>maxInclusive=6.283<br>minInclusive=0<br>units=Radian<br>referenceFrame=TrueNorth                                                                     | Specifies the horizontal angular vector from an observer to an entity, relative to true north. The measurement is stated in radians between 0 and 2 pi.                          |
| BooleanEnumType          | boolean        |                                                                                                                                                                          | A mutually exclusive set of values that defines the truth values of logical algebra.                                                                                             |

| Type Name                  | Primitive Type | Range of Values                                                                                                    | Description                                                                                                                              |
|----------------------------|----------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| CameraZoomLevel            | double         | fractionDigits=7<br>maxInclusive=100<br>minInclusive=0<br>units=N/A                                                | Specifies the zoom level.                                                                                                                |
| CommsRateBitsPerSecond     | long           | maxInclusive=65535000<br>minInclusive=0<br>units=BitsPerSecond<br>referenceFrame=Counting<br>fractionDigits=3      | Realizes CommsRateType: an Entity that describes a measure of the data rate over a communications link.                                  |
| CommsRateMegabitsPerSecond | double         | fractionDigits=3<br>maxInclusive=1125000<br>minInclusive=0<br>units=MegabitsPerSecond<br>referenceFrame=Counting   | Represents the number of bits that are conveyed or processed per unit of time measured in megabits per second.                           |
| Conductivity               | double         | fractionDigits=3<br>maxInclusive=N/A<br>minInclusive=N/A<br>units=SiemensPerMeter<br>referenceFrame=LocalWaterMass | Represents an object property that describes how well the object conducts electricity.                                                   |
| Count                      | long           | referenceFrame=Counting<br>units=N/A<br>minInclusive=-2147483648<br>maxInclusive=2147483647<br>fractionDigits=0    | Represents a whole (non-fractional) number that can be positive, negative or zero.                                                       |
| CourseTrueNorth            | double         | fractionDigits=3<br>maxInclusive=3.142<br>minInclusive=-3.142<br>units=Radian<br>referenceFrame=TrueNorth          | Specifies the direction of the platform's motion relative to true north. The measurement is stated in radians between 0 and 2 pi.        |
| CovarAngleAngle            | double         | fractionDigits=3<br>maxInclusive=1000000000<br>minInclusive=-1000000000<br>units=N/A                               | Specifies a radians-radians measure of linear dependence that indicates angle-angle error covariance in the Polar coordinate system.     |
| CovarDisAngle              | double         | fractionDigits=3<br>maxInclusive=1000000000<br>minInclusive=-1000000000<br>units=MetersPerRadian                   | Specifies a meters-radians measure of linear dependence that indicates distance-angle error covariance in the Polar coordinate system.   |
| CovarDisDis                | double         | fractionDigits=3<br>maxInclusive=1000000000<br>minInclusive=-1000000000<br>units=N/A                               | Specifies a meters-meters measure of linear dependence that indicates distance-distance error covariance in the Polar coordinate system. |
| CovarOrientation           | double         | referenceFrame=Counting<br>units=N/A<br>fractionDigits=3                                                           | Specifies a radians-radians measure of linear dependence that indicates the 1-sigma error covariance of the orientation angle.           |
| CovarPosPosNED             | double         | referenceFrame=Counting                                                                                            | Describes a meters-meters measure of linear dependence that indicates position-position error covariance in the NED coordinate system    |

| Type Name                    | Primitive Type | Range of Values                                                                                                   | Description                                                                                                            |
|------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| DataTransferRate             | double         | fractionDigits=3<br>maxInclusive=N/A<br>minInclusive=0<br>units=BytesPerSecond<br>referenceFrame=Counting         | Represents the number of bits that are conveyed or processed per unit of time measured in kilobits per second.         |
| DateTimeNanoseconds          | long           | units=Nanoseconds<br>minInclusive=0<br>maxInclusive=999999999<br>fractionDigits=0                                 | number of nanoseconds elapsed within the current second.                                                               |
| DateTimeSeconds              | longlong       | units=Seconds<br>minInclusive=-9223372036854775807<br>maxInclusive=9223372036854775807<br>fractionDigits=0        | seconds offset from the standard POSIX (IEEE Std 1003.1-2017) epoch reference point of January 1st, 1970 00:00:00 UTC. |
| Density                      | double         | fractionDigits=3<br>maxInclusive=3e17<br>minInclusive=0<br>units=KilogramPerCubicMeter<br>referenceFrame=Counting | Realizes DensityType: an Entity that describes the number of occurrences of a repeating event per unit volume.         |
| DewPointTemperature          | double         | fractionDigits=3<br>maxInclusive=100<br>minInclusive=-100<br>units=Celsius                                        | Specifies the dew point temperature.                                                                                   |
| DigitalAudioSensitivityCount | double         | fractionDigits=3<br>maxInclusive=100<br>minInclusive=0<br>units=N/A                                               | Specifies the digital audio sensitivity as a percentage.                                                               |
| Distance                     | double         | fractionDigits=3<br>maxInclusive=401056000<br>minInclusive=0<br>units=Meter<br>referenceFrame=Counting            | This type stores a distance in meters.                                                                                 |
| DistanceAGL                  | double         | fractionDigits=3<br>minInclusive=0.0<br>units=Meter<br>referenceFrame=AGL                                         | Describes the height above ground level of the vehicle.                                                                |
| DistanceASF                  | double         | fractionDigits=3<br>maxInclusive=401056000<br>minInclusive=0<br>units=Meter<br>referenceFrame=ASF                 | The altitude or distance above the sea floor in meters.                                                                |
| DistanceBSL                  | double         | fractionDigits=3<br>maxInclusive=10000<br>minInclusive=0<br>units=Meter<br>referenceFrame=BSL                     | The distance below sea level in meters.                                                                                |
| DistancePrecise              | double         | fractionDigits=6<br>maxInclusive=401056000<br>minInclusive=0<br>units=Meter<br>referenceFrame=Counting            | Represents a distance measured in meters to the nearest 0.000001.                                                      |

| Type Name                        | Primitive Type | Range of Values                                                                                                                                                                              | Description                                                                                                       |
|----------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| DownSpeed                        | double         | axisDirection=down<br>axisUnit=MeterPerSecond<br>maximumValue=299,792,458<br>minimumValue=-299,792,458<br>rangeMeaning=exact<br>resolution=0.001<br>units=MeterPerSecond<br>fractionDigits=3 | Used for measuring speed and increases in magnitude as speed toward the center of the Earth increases.            |
| DurationHours                    | double         | fractionDigits=3<br>maxInclusive=10505<br>minInclusive=0<br>units=Hour<br>referenceFrame=Counting                                                                                            | Represents a time duration in hours.                                                                              |
| DurationSeconds                  | double         | fractionDigits=6<br>maxInclusive=37817280<br>minInclusive=0<br>units=Seconds<br>referenceFrame=Counting                                                                                      | Represents a time duration in seconds.                                                                            |
| EastPosition                     | double         | fractionDigits=3<br>maxInclusive=100000<br>minInclusive=-100000<br>units=Meter                                                                                                               | Used for measuring position and increases in magnitude along the east-facing axis in the local coordinate system. |
| EastSpeed                        | double         | axisDirection=east<br>axisUnit=MeterPerSecond<br>maximumValue=299,792,458<br>minimumValue=-299,792,458<br>rangeMeaning=exact<br>resolution=0.001<br>units=MeterPerSecond<br>fractionDigits=3 | Used for measuring speed and increases in magnitude as speed in the easterly direction increases.                 |
| Effort                           | double         | fractionDigits=3<br>maxInclusive=100<br>minInclusive=-100<br>units=Percent<br>referenceFrame=PlatformXYZ                                                                                     | Represents the level of effort measured in percent.                                                               |
| EngineSpeed                      | double         | referenceFrame=Counting<br>units=RevolutionsPerMinute<br>minInclusive=-100000<br>maxInclusive=100000<br>fractionDigits=0                                                                     | This type stores number of occurrences in revolutions per minute (RPM). Negative number is used for reverse RPM.  |
| FieldOfViewLineOfSightFocalPlane | double         | fractionDigits=3<br>maxInclusive=6.283<br>minInclusive=0<br>units=Radian<br>referenceFrame=LineOfSightFocalPlane                                                                             | Specifies the solid angle along the Y axis within which a sensor provides-detection.                              |
| FocalLength                      | double         | fractionDigits=3<br>maxInclusive=10000<br>minInclusive=-10000<br>units=Millimeter                                                                                                            | Represents the focal length.                                                                                      |

| Type Name           | Primitive Type | Range of Values                                                                                                                                                                             | Description                                                                                                                                                                                                                                                                 |
|---------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FocusValue          | double         | fractionDigits=3<br>maxInclusive=100<br>minInclusive=0<br>units=Percent<br>referenceFrame=Counting                                                                                          | Realizes SizeType: an entity that describes the magnitude or number of a measurable or countable entity.                                                                                                                                                                    |
| FrameRateFPS        | double         | fractionDigits=0<br>maxInclusive=1000<br>minInclusive=0<br>units=FramesPerSecond<br>referenceFrame=Counting                                                                                 | Represents the number of images transferred or recorded per second.                                                                                                                                                                                                         |
| FrequencyHertz      | double         | fractionDigits=6<br>maxInclusive=1e10<br>minInclusive=0.0<br>units=Hertz<br>referenceFrame=Counting                                                                                         | This type stores Frequency in Hz.                                                                                                                                                                                                                                           |
| FrequencyRPM        | long           | fractionDigits=0<br>maxInclusive=100000<br>minInclusive=-100000<br>units=RevolutionsPerMinute<br>referenceFrame=Counting                                                                    | This type stores number of occurrences in revolutions per minute (RPM). Negative number is used for reverse RPM.                                                                                                                                                            |
| GammaAnglePropulsor | double         | fractionDigits=3<br>maxInclusive=3.142<br>minInclusive=-3.142<br>units=Radian<br>referenceFrame=PropulsorXYZ                                                                                | Specifies the angle of the propulsor about the Y-Axis of the vehicle reference frame.                                                                                                                                                                                       |
| GeodeticAltitude    | double         | fractionDigits=6<br>maxInclusive=700000<br>minInclusive=-10000<br>units=Meter<br>axisAbbrev=Altitude<br>axisDirection=up<br>axisUnit=Meter<br>rangeMeaning=exact<br>resolution=0.0000000001 | Used for measuring position and increases in magnitude as position extends upward. Altitude measurements are expressed in meters.                                                                                                                                           |
| GeodeticLatitude    | double         | axisAbbrev=Latitude<br>axisDirection=north/south<br>axisUnit=Degrees<br>maximumValue=90.0<br>minimumValue=-90.0<br>rangeMeaning=exact<br>resolution=0.0000000001                            | Used for measuring position and increases in magnitude as position extends from the south pole to the north pole. Latitude measurements are expressed in degrees.                                                                                                           |
| GeodeticLongitude   | double         | axisAbbrev=Longitude<br>axisDirection=east<br>axisUnit=Degrees<br>maximumValue=180.0<br>minimumValue=-180.0<br>rangeMeaning=wraparound<br>resolution=0.0000000001                           | Used for measuring position and increases in magnitude as position extends eastward. Longitude measurements are expressed in degrees. Longitude measurements are periodic and whose limits (min and max), while mathematically discontinuous, represent a continuous range. |

| Type Name                           | Primitive Type | Range of Values                                                                                                               | Description                                                                                                                                                                                                                             |
|-------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GroundSpeed                         | double         | fractionDigits=3<br>maxInclusive=299,792,458<br>minInclusive=-299,792,458<br>units=MeterPerSecond<br>referenceFrame=TrueNorth | The magnitude of the horizontal velocity vector of an aircraft relative to the ground.                                                                                                                                                  |
| H264VideoCommsRateMegabitsPerSecond | double         | fractionDigits=3<br>maxInclusive=65535<br>minInclusive=0<br>units=N/A                                                         | Specifies the H264Video comms rate.                                                                                                                                                                                                     |
| H264VideoCount                      | double         | fractionDigits=0<br>maxInclusive=65535<br>minInclusive=0<br>units=N/A                                                         | Specifies the H264Video count.                                                                                                                                                                                                          |
| HeadingCurrentDirection             | double         | fractionDigits=3<br>maxInclusive=3.142<br>minInclusive=-3.142<br>units=Radian<br>referenceFrame=CurrentDirection              | Describes heading as a value between -pi and pi with respect to the current direction.                                                                                                                                                  |
| HeadingMagneticNorth                | double         | fractionDigits=3<br>maxInclusive=3.142<br>minInclusive=-3.142<br>units=Radian<br>referenceFrame=MagneticNorth                 | Describes heading as a value between -pi and pi with respect to Magnetic North.                                                                                                                                                         |
| HeadingTrueNorthAngle               | double         | fractionDigits=3<br>maxInclusive=3.142<br>minInclusive=-3.142<br>units=Radian<br>referenceFrame=TrueNorth                     | Describes heading as a value between -pi and pi with respect to True North.                                                                                                                                                             |
| HeadingWindDirection                | double         | fractionDigits=3<br>maxInclusive=3.142<br>minInclusive=-3.142<br>units=Radian<br>referenceFrame=WindDirection                 | Describes heading as a value between -pi and pi with respect to the wind direction.                                                                                                                                                     |
| IndicatedAirspeed                   | double         | fractionDigits=6<br>maxInclusive=299,792,458<br>minInclusive=0<br>units=MeterPerSecond<br>referenceFrame=LocalAirMass         | This type specifies the magnitude of an aircraft's velocity (the rate of change of its position). Indicated airspeed (IAS) is the airspeed read directly from the airspeed indicator on an aircraft, driven by the pitot-static system. |
| IPPortCounting                      | long           | maxInclusive=65,535<br>minInclusive=0<br>units=N/A<br>referenceFrame=Counting<br>fractionDigits=0                             | Realizes AddressType: an Entity that describes a logical location, e.g. an IP address, or port.                                                                                                                                         |
| LargeCollectionSize                 | long           | fractionDigits=0<br>maxInclusive=2147483647<br>minInclusive=0<br>units=N/A                                                    | Specifies the size of a Large Collection.                                                                                                                                                                                               |

| Type Name            | Primitive Type | Range of Values                                                                                                                                                                               | Description                                                                                                                                                                                            |
|----------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MagneticVariation    | double         | fractionDigits=3<br>maxInclusive=3.142<br>minInclusive=-3.142<br>units=Radian<br>referenceFrame=TrueNorth                                                                                     | Specifies the angle on the horizontal plane between true north and magnetic north (the direction the north end of the compass needle points). The measurement is stated in radians between -pi and pi. |
| Mass                 | double         | fractionDigits=3<br>maxInclusive=100000000<br>minInclusive=0<br>units=Kilogram<br>referenceFrame=Counting                                                                                     | This type stores mass in kilograms.                                                                                                                                                                    |
| MassFlowRate         | double         | fractionDigits=3<br>maxInclusive=N/A<br>minInclusive=N/A<br>units=KilogramsPerSecond<br>referenceFrame=Counting                                                                               | Represents the mass flow rate measured in kilogram per second.                                                                                                                                         |
| MaxEngineOilPressure | double         | fractionDigits=6<br>maxInclusive=512<br>minInclusive=0<br>units=KiloPascal                                                                                                                    | Describes the maximum oil pressure for an engine.                                                                                                                                                      |
| MinMaxRangeType      | double         | fractionDigits=0<br>maxInclusive=100000<br>minInclusive=0<br>units=Meter                                                                                                                      | Specifies the min and max for RangeType.                                                                                                                                                               |
| MSLAltitude          | double         | fractionDigits=3<br>minInclusive=0.0<br>units=Meter<br>referenceFrame=Altitude                                                                                                                | Describes the current orthometric height above the Geoid (Mean Sea Level).                                                                                                                             |
| NorthPosition        | double         | maxInclusive=100000<br>minInclusive=-100000<br>units=Meter                                                                                                                                    | Used for measuring position and increases in magnitude along the north-facing axis in the local coordinate system.                                                                                     |
| NorthSpeed           | double         | axisDirection=north<br>axisUnit=MeterPerSecond<br>maximumValue=299,792,458<br>minimumValue=-299,792,458<br>rangeMeaning=exact<br>resolution=0.001<br>units=MeterPerSecond<br>fractionDigits=3 | Used for measuring speed and increases in magnitude as speed in the northerly direction increases.                                                                                                     |
| NumericGUID          | octet[16]      | units=N/A<br>minInclusive=0<br>maxInclusive=(2 <sup>128</sup> )-1<br>fractionDigits=0                                                                                                         | Represents a 128-bit number according to RFC 4122 variant 2.                                                                                                                                           |
| Order                | long           | referenceFrame=Counting<br>units=N/A<br>minInclusive=0<br>maxInclusive=2147483647<br>fractionDigits=0                                                                                         | Represents nonnegative integers.                                                                                                                                                                       |

| Type Name             | Primitive Type         | Range of Values                                                                                                     | Description                                                                                                                                                                                                                                                                                                                      |
|-----------------------|------------------------|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OrientationQuaternion | BasicTypes::Quaternion | fractionDigits=6<br>maxInclusive=N/A<br>minInclusive=N/A<br>referenceFrame=Counting<br>units=N/A                    | Represents a unit quaternion (a, b, c, d) which specifies the axis and angle of rotation.                                                                                                                                                                                                                                        |
| PanTiltJointAngleRate | double                 | fractionDigits=3<br>maxInclusive=N/A<br>minInclusive=N/A<br>units=RadianPerSecond                                   | Represents an angle rate of the pan tilt joint.                                                                                                                                                                                                                                                                                  |
| Percent               | double                 | fractionDigits=3<br>maxInclusive=1000<br>minInclusive=0<br>units=Percent<br>referenceFrame=Counting                 | Defines a percentage where 100% = 100.0. Values greater than 100% are allowed.                                                                                                                                                                                                                                                   |
| PitchAcceleration     | double                 | fractionDigits=3<br>maxInclusive=10000<br>minInclusive=0<br>units=RadianPerSecondSquared<br>referenceFrame=Counting | Specifies the platform's angular acceleration about the lateral axis in a locally level, North-East-Down coordinate system centered on the platform.                                                                                                                                                                             |
| PitchHalfAngle        | double                 | fractionDigits=3<br>maxInclusive=1.571<br>minInclusive=-1.571<br>units=Radian<br>referenceFrame=PlatformNED         | Specifies the platform's rotation about the lateral axis (e.g. the axis parallel to the wings) in a locally level, North-East-Down coordinate system centered on the platform. Pitch is zero when the platform is "nose to tail level" in the North-East plane. The measurement is stated in radians between -0.5 pi and 0.5 pi. |
| PositiveCount         | double                 | fractionDigits=0<br>maxInclusive=2147483647<br>minInclusive=1<br>units=N/A                                          | Represents a whole (non-fractional) number that can be positive but not zero.                                                                                                                                                                                                                                                    |
| PowerBusCurrent       | double                 | fractionDigits=3<br>maxInclusive=100000<br>minInclusive=-100000<br>units=Ampere<br>referenceFrame=None              | Represents the time rate of flow of electric charge measured in amperes.                                                                                                                                                                                                                                                         |
| PowerBusVoltage       | double                 | fractionDigits=3<br>maxInclusive=100000<br>minInclusive=-100000<br>units=Volt<br>referenceFrame=None                | Represents the potential difference in charge between two points in an electrical field measured in volts.                                                                                                                                                                                                                       |
| PressureKiloPascals   | double                 | fractionDigits=3<br>maxInclusive=51200<br>minInclusive=0<br>units=KiloPascal<br>referenceFrame=STP                  | Represents barometric pressure and is stored in KiloPascals.                                                                                                                                                                                                                                                                     |
| Priority              | long                   | fractionDigits=0<br>maxInclusive=255<br>minInclusive=0                                                              | Represents the priority as a positive integer. Low numbers represent low priority while higher numbers represent high priority.                                                                                                                                                                                                  |

| Type Name                     | Primitive Type | Range of Values                                                                                                     | Description                                                                                                                                                                                                                      |
|-------------------------------|----------------|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PrismaticJointSpeed           | double         | fractionDigits=0<br>maxInclusive=5<br>minInclusive=-5<br>units=MeterPerSecond                                       | Represents speed for the prismatic joint.                                                                                                                                                                                        |
| PropellerPitchAnglePropulsor  | double         | fractionDigits=3<br>maxInclusive=3.142<br>minInclusive=-3.142<br>units=Radian<br>referenceFrame=PropulsorXYZ        | Specifies the angle of the propulsor propellor for propulsors with a variable pitch propellor.                                                                                                                                   |
| RadioFrequencyHertz           | double         | fractionDigits=6<br>maxInclusive=1e10<br>minInclusive=0.0<br>units=Hertz<br>referenceFrame=Counting                 | Represents the radio frequency.                                                                                                                                                                                                  |
| RangeTypeFrequency            | double         | fractionDigits=0<br>maxInclusive=1000<br>minInclusive=0<br>units=Hertz                                              | Specifies the frequency for RangeType.                                                                                                                                                                                           |
| RelativeAngle                 | double         | fractionDigits=3<br>maxInclusive=3.142<br>minInclusive=-3.142<br>units=Radian<br>referenceFrame=Counting            | Specifies the angle between two intersecting rays. The measurement is stated in radians between -pi and pi.                                                                                                                      |
| RelativeHumidity              | double         | fractionDigits=3<br>maxInclusive=1000<br>minInclusive=0<br>units=Percent<br>referenceFrame=LocalAirMass             | Defines a percentage where 100% = 100.0. Values greater than 100% are allowed.                                                                                                                                                   |
| RevoluteJointAngleMeasurement | double         | fractionDigits=3<br>maxInclusive=N/A<br>minInclusive=N/A<br>units=Radian                                            | Represents an angle measurement of the revolute joint.                                                                                                                                                                           |
| RhoAnglePropulsor             | double         | fractionDigits=3<br>maxInclusive=3.142<br>minInclusive=-3.142<br>units=Radian<br>referenceFrame=PropulsorXYZ        | Specifies the angle of the propulsor about the Z-Axis of the vehicle reference frame.                                                                                                                                            |
| RollAcceleration              | double         | fractionDigits=3<br>maxInclusive=10000<br>minInclusive=0<br>units=RadianPerSecondSquared<br>referenceFrame=Counting | Specifies the angular acceleration of the platform about the longitudinal axis (e.g. the axis through the body of the vehicle from tail to nose) in a locally level, North-East-Down coordinate system centered on the platform. |

| Type Name              | Primitive Type | Range of Values                                                                                                         | Description                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RollAngle              | double         | fractionDigits=3<br>maxInclusive=3.142<br>minInclusive=-3.142<br>units=Radian<br>referenceFrame=PlatformNED             | Specifies a platform's rotation about the longitudinal axis (e.g. the axis through the body of the vehicle from tail to nose) in a locally level, North-East-Down coordinate system centered on the vehicle. Roll is zero when the platform is "wing-tip to wing-tip" level in the North-East plane. The measurement is stated in radians between -pi and pi. |
| Salinity               | double         | fractionDigits=3<br>maxInclusive=N/A<br>minInclusive=N/A<br>units=GramsPerKilogram<br>referenceFrame=LocalWaterMass     | Represents the concentration of dissolved salts in water etc. measured in grams per kilogram.                                                                                                                                                                                                                                                                 |
| ShutterSpeed           | double         | fractionDigits=6<br>maxInclusive=N/A<br>minInclusive=0<br>units=Seconds                                                 | Represents the shutter speed.                                                                                                                                                                                                                                                                                                                                 |
| SidesCount             | long           | fractionDigits=0<br>maxInclusive=255<br>minInclusive=3<br>units=N/A                                                     | Represents the number of sides a polygon has using a positive integer.                                                                                                                                                                                                                                                                                        |
| SizeNumeral            | double         | referenceFrame=Counting<br>units=N/A<br>minInclusive=-1e12<br>maxInclusive=1e12<br>fractionDigits=3                     | Represents nonnegative integers.                                                                                                                                                                                                                                                                                                                              |
| Speed                  | double         | fractionDigits=6<br>maxInclusive=299,792,458<br>minInclusive=0<br>units=MeterPerSecond<br>referenceFrame=Counting       | This type stores speed in meters/s.                                                                                                                                                                                                                                                                                                                           |
| SpeedLocalWaterMass    | double         | fractionDigits=6<br>maxInclusive=299,792,458<br>minInclusive=0<br>units=MeterPerSecond<br>referenceFrame=LocalWaterMass | This type stores speed in meters/s.                                                                                                                                                                                                                                                                                                                           |
| StringLongDescription  | string         | length=4095<br>units=N/A<br>minInclusive=N/A<br>maxInclusive=N/A                                                        | Represents a long format description.                                                                                                                                                                                                                                                                                                                         |
| StringShortDescription | string         | length=1023<br>units=N/A<br>minInclusive=N/A<br>maxInclusive=N/A                                                        | Represents a short format description.                                                                                                                                                                                                                                                                                                                        |
| Temperature            | double         | fractionDigits=3<br>maxInclusive=1000<br>minInclusive=-273<br>units=Celsius<br>referenceFrame=Counting                  | Represents the degree or intensity of warmth or coldness presence in a substance. Measured in Celsius.                                                                                                                                                                                                                                                        |

| Type Name                      | Primitive Type | Range of Values                                                                                                                   | Description                                                                                          |
|--------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| TimeBetweenBlasts              | double         | fractionDigits=0<br>maxInclusive=255<br>minInclusive=1<br>units=Seconds                                                           | Describes time between blasts.                                                                       |
| UniformResourceIdentifier      | string         | length=2047<br>units=N/A<br>minInclusive=N/A<br>maxInclusive=N/A                                                                  | Represents a Uniform Resource Identifier (URI).                                                      |
| VideoIlluminatorBeamWidth      | double         | fractionDigits=3<br>maxInclusive=6.28318530718<br>minInclusive=0<br>units=Radian                                                  | Specifies the VideoIlluminator beam width.                                                           |
| VideoIlluminatorIntensityLevel | double         | fractionDigits=3<br>maxInclusive=100<br>minInclusive=0<br>units=N/A                                                               | Specifies the VideoIlluminator intensity level.                                                      |
| VolumeCubicMeter               | double         | fractionDigits=6<br>maxInclusive=1000<br>minInclusive=0<br>units=VolumeCubicMeter<br>referenceFrame=Counting                      | Represents the quantity of three-dimensional space enclosed by some closed boundary                  |
| VolumePercent                  | double         | fractionDigits=3<br>maxInclusive=1000<br>minInclusive=0<br>units=Percent<br>referenceFrame=Counting                               | Defines a percentage where 100% = 100.0. Values greater than 100% are allowed.                       |
| VolumetricFlowRate             | double         | fractionDigits=6<br>maxInclusive=100,000,000<br>minInclusive=-100,000,000<br>units=CubicMeterPerSecond<br>referenceFrame=Counting | Specifies the amount of fluid moving through a pipe or channel per unit time.                        |
| WaterTemperature               | double         | fractionDigits=3<br>maxInclusive=100<br>minInclusive=-22<br>units=Celsius                                                         | Specifies the water temperature.                                                                     |
| WeatherBarometricPressure      | double         | fractionDigits=3<br>maxInclusive=1200<br>minInclusive=600<br>units=Millibar                                                       | Specifies the barometric pressure.                                                                   |
| XPosition                      | double         | fractionDigits=3<br>maxInclusive=N/A<br>minInclusive=N/A<br>units=Meter                                                           | Represents the x axis position.                                                                      |
| YawAcceleration                | double         | fractionDigits=3<br>maxInclusive=N/A<br>minInclusive=N/A<br>units=RadianPerSecondSquared<br>referenceFrame=Counting               | Specifies the platform's angular acceleration about the vertical axis in the body coordinate system. |

| Type Name   | Primitive Type | Range of Values                                                                                                                                                                                    | Description                                                                            |
|-------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| YawPosAngle | double         | <code>fractionDigits=3</code><br><code>maxInclusive=6.283185307179586364925286766559</code><br><code>minInclusive=0</code><br><code>units=Radian</code><br><code>referenceFrame=PlatformNED</code> | The yaw angle relative to the NED coordinate system centered at the platform location. |
| YPosition   | double         | <code>fractionDigits=3</code><br><code>maxInclusive=N/A</code><br><code>minInclusive=N/A</code><br><code>units=Meter</code>                                                                        | Represents the y axis position.                                                        |
| ZPosition   | double         | <code>fractionDigits=3</code><br><code>maxInclusive=100000</code><br><code>minInclusive=-100000</code><br><code>units=Meter</code>                                                                 | Represents the z axis position.                                                        |

## A Appendices

### A.1 Glossary

Note: This glossary aims to define terms that are uncommon, or have a special meaning in the context of UMAA and/or the DoD. This glossary covers the complete UMAA specification. Not every word defined here appears in every ICD.

|                       |                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Almanac Data (GPS)    | A navigation message that contains information about the time and status of the entire satellite constellation.                                                                                                                                                                                                                                                    |
| Coulomb               | The SI unit of electric charge, equal to the quantity of electricity conveyed in one second by a current of one ampere.                                                                                                                                                                                                                                            |
| Ephemeris Data (GPS)  | A navigation message used to calculate the position of each satellite in orbit.                                                                                                                                                                                                                                                                                    |
| Glowplug or Glow Plug | A heating device used to aid in starting diesel engines.                                                                                                                                                                                                                                                                                                           |
| Interoperability      | 1) The ability to act together coherently, effectively, and efficiently to achieve tactical, operational, and strategic objectives. 2) The condition achieved among communications-electronics systems or items of communications-electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users. |
| Mean Sea Level        | The average height of the surface of the sea for all stages of the tide; used as a reference for elevations.                                                                                                                                                                                                                                                       |
| Middleware            | A type of computer software that provides services to software applications beyond those available from the operating system. Middleware makes it easier for software developers to implement communication and input/output, so they can focus on the specific purpose of their application.                                                                      |
| SoaML                 | The Service oriented architecture Modeling Language (SoaML) specification that provides a metamodel and a UML profile for the specification and design of services within a service-oriented architecture. The specification is managed by the Object Management Group (OMG).                                                                                      |

### A.2 Acronyms

Note: This acronym list is included in every ICD and covers the complete UMAA specification. Not every acronym appears in every ICD.

|      |                                     |
|------|-------------------------------------|
| ADD  | Architecture Design Description     |
| AGL  | Above Sea Level                     |
| ASF  | Above Sea Floor                     |
| BSL  | Below Sea Level                     |
| BWL  | Beam at Waterline                   |
| C2   | Command and Control                 |
| CMD  | Command                             |
| CO   | Comms Operations                    |
| CPA  | Closest Point of Approach           |
| CTD  | Conductivity, Temperature and Depth |
| DDS  | Data Distribution Service           |
| DTED | Digital Terrain Elevation Data      |
| EGM  | Earth Gravity Model                 |
| EO   | Engineering Operations              |
| FB   | Feedback                            |
| GUID | Globally Unique Identifier          |
| HM&E | Hull, Mechanical, & Electrical      |
| ICD  | Interface Control Document          |

|       |                                                 |
|-------|-------------------------------------------------|
| ID    | Identifier                                      |
| IDL   | Interface Definition Language Specification     |
| IMO   | International Maritime Organization             |
| INU   | Inertial Navigation Unit                        |
| LDM   | Logical Data Model                              |
| LOA   | Length Over All                                 |
| LRC   | Long Range Cruise                               |
| LWL   | Length at Waterline                             |
| MDE   | Maritime Domain Extensions                      |
| MEC   | Maximum Endurance Cruise                        |
| MM    | Mission Management                              |
| MMSI  | Maritime Mobile Service Identity                |
| MO    | Maneuver Operations                             |
| MRC   | Maximum Range Cruise                            |
| MSL   | Mean Sea Level                                  |
| OMG   | Object Management Group                         |
| PIM   | Platform Independent Model                      |
| PMC   | Primary Mission Control                         |
| PNT   | Precision Navigation and Timing                 |
| PO    | Processing Operations                           |
| PSM   | Platform Specific Model                         |
| RMS   | Root-Mean-Square                                |
| RPM   | Revolutions per minute                          |
| RTPS  | Real Time Publish Subscribe                     |
| RTSP  | Real Time Streaming Protocol                    |
| SA    | Situational Awareness                           |
| SEM   | Sensor and Effector Management                  |
| SO    | Support Operations                              |
| SoaML | Service-oriented architecture Modeling Language |
| STP   | Standard Temperature and Pressure               |
| UCS   | Unmanned Systems Control Segment                |
| UMAA  | Unmanned Maritime Autonomy Architecture         |
| UML   | Unified Modeling Language                       |
| UMS   | Unmanned Maritime System                        |
| UMV   | Unmanned Maritime Vehicle                       |
| UxS   | Unmanned System                                 |
| WGS84 | Global Coordinate System                        |
| WMM   | World Magnetic Model                            |
| WMO   | World Meteorological Organization               |