GridOps Management Suite 3.10

Weather Interface

Functional Specification

Document Version: 1.0

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Table of Contents

Table of Figures

Table of Tables

Table of Documents

No table of figures entries found.

1. REFERENCES

#	Title	Description
1.	EcoStruxure GridOps Management Suite 3.10 Enterprise Integration Platform - Functional Specification	The document represents a set of common integration principles applied to all baseline integration adapters.
2.	EcoStruxure GridOps Management Suite 3.10 Weather Interface	EcoStruxure GridOps Management Suite 3.10 Weather Interface zip file contains essential configuration information, as well as web service definitions complemented with message examples.

2. ASSUMPTIONS

The Weather integration is designed and implemented under the following assumptions:

- 3rd party weather provider is the source system both for actual and forecast weather data.
- Integration is implemented through the Weather Adapter.
- Following actual and forecast weather data can be updated in the EcoStruxure GridOps (default units are specified):
  - Humidity (%)
  - Temperature (°C)
  - Insolation [W/m2]
  - FeelsLike (°C)
  - WindSpeed (km/h)
  - WindDirection (Degree)
  - SkyCover (%)
  - Precipitation (mm)
- EcoStruxure GridOps advanced applications consider only hourly forecast weather data. Hence, the regular forecast weather data is utilized within the Weather Adapter where provided timestamp is applicable only for first value in given sequence. Timestamps for other values are calculated based on the predefined offset (hourly interval).
- Out of the box unit conversion is available.
- Out of the box integration is “one-way”, meaning that 3rd party weather provided can push data to the EcoStruxure GridOps via RESTful or SOAP base Web Services exposed by the Weather Adapter.
- Both JSON and XML data formats are supported through the Weather Adapter configuration. In case of JSON data representation, the RESTful web services are utilized. While for SOAP (XML) data format, web services compliant with the IEC 61968-100 standard are exposed.
- Enterprise integration pattern used is synchronous request/response service call.

3. INTRODUCTION

EcoStruxure GridOps Management Suite is a family of solutions designed to help electric utilities in the operations and management of their grid. It is offered as EcoStruxure ADMS, EcoStruxure Grid Operation, EcoStruxure DERMS or EcoStruxure Energy Transmission Operation solutions, which share the same technology platform.

NOTE: The functionality described in this document applies to all solutions.

NOTE: Most images presented in this document are related to the EcoStruxure ADMS solution and should be used as an example. The images for other solutions may differ slightly.

Many of EcoStruxure GridOps advanced applications use weather data measurements as inputs in their execution algorithms. Applications require both current (actual) and forecast weather data measurements. Current (actual) weather data is modeled with AnalogSignal type, while forecast weather data is modeled using ArraySignal type.

In the network model weather data is modeled using measurements associated to so called "WeatherRegion" objects which are associated to one or more substations. Creation of weather regions, association of substations to them and definition of weather data measurements is done by using the network data editing application called Network Builder. More details about the weather region creation process can be found in Network Model Population chapter.

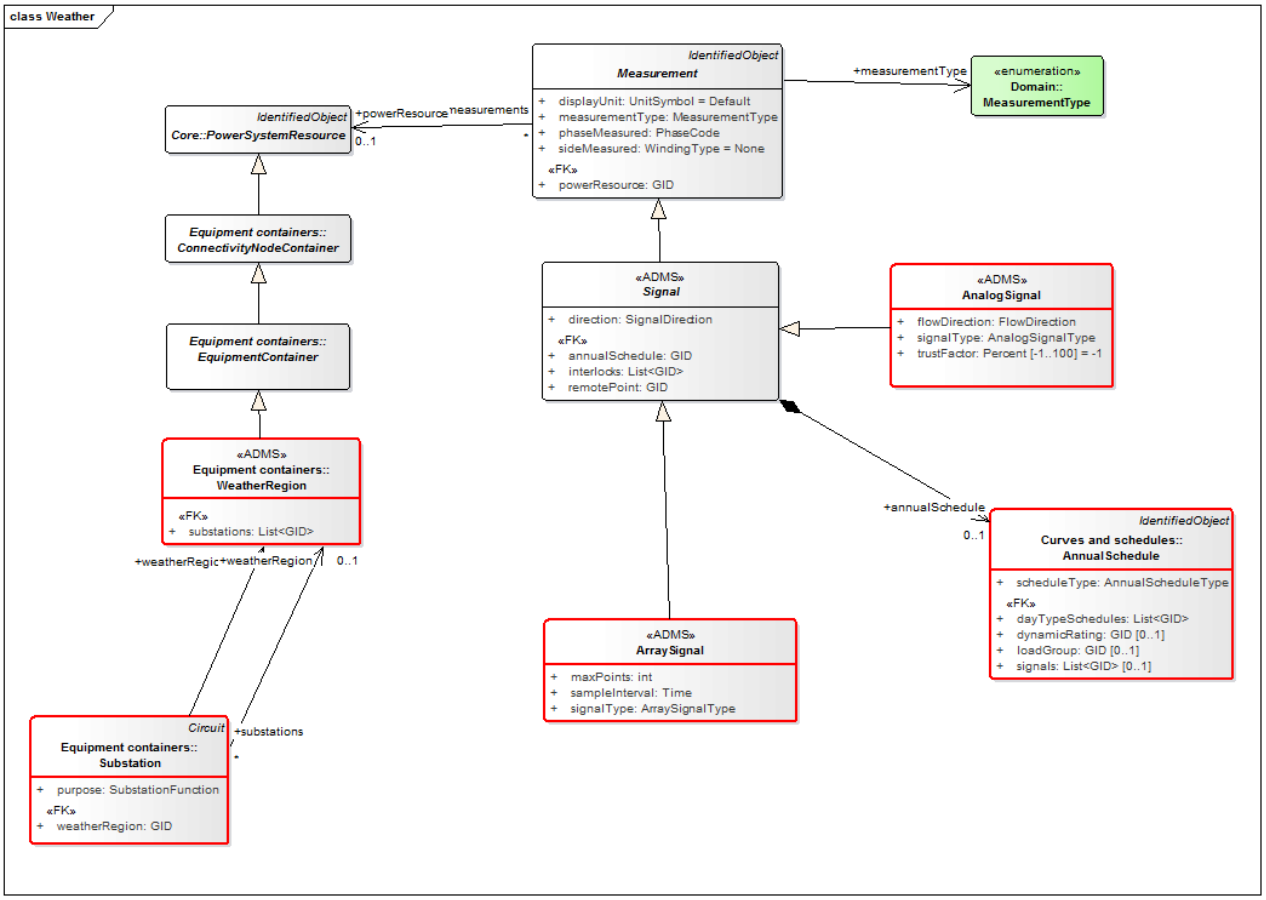

Figure 3.1 – Network model – the weather region

3.1. General Architecture

It is thoroughly described in the *EcoStruxure GridOps Management Suite 3.10 Enterprise Integration Platform - Functional Specification* [1].

4. INTERFACE OVERVIEW

The Weather interface is implemented through the Weather Adapter component. The aforementioned adapter implements (hosts) the RESTful or SOAP based Web Services with the appropriate set of functionalities which enable the external system to:

- Update actual weather data for one weather region.
- Update actual weather data for all weather regions.
- Update forecast weather data for one weather region.
- Update forecast weather data for all weather regions.

The following chapters provide more details regarding mentioned interface (web services), appropriate operations, data mappings, error handling scenarios, etc.

The use case diagram that represents common participants (actors) and users of mentioned interfaces in the Weather integration is given Figure 4.1.

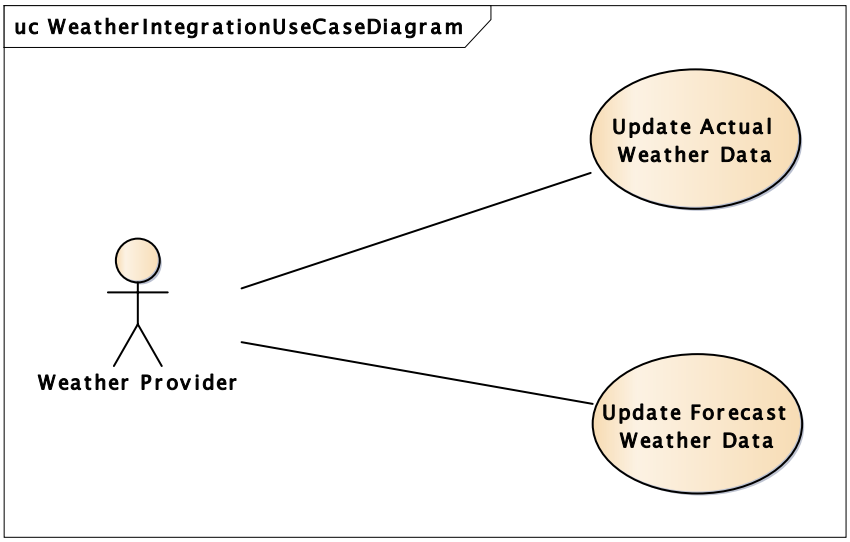

Figure 4.1 – The Weather Integration use case diagram

5. UPDATE WEATHER DATA SERVICE

5.1. Update Actual Weather Data

5.1.1. Overview

As it is explained in previous chapters, the Weather Adapter exposes either RESTful or SOAP based Web Service through which weather data can be updated by the external system. In order to update actual weather data, the external system needs to invoke the appropriate operation.

Once the request is received, the Weather Adapter performs initial validation of the received data, transforms it into the appropriate internal format and applies it to the DMZ system. The second level of validation is performed in the software during the insertion of the weather data. All changes introduced to DMZ are asynchronously replicated to the CORE system.

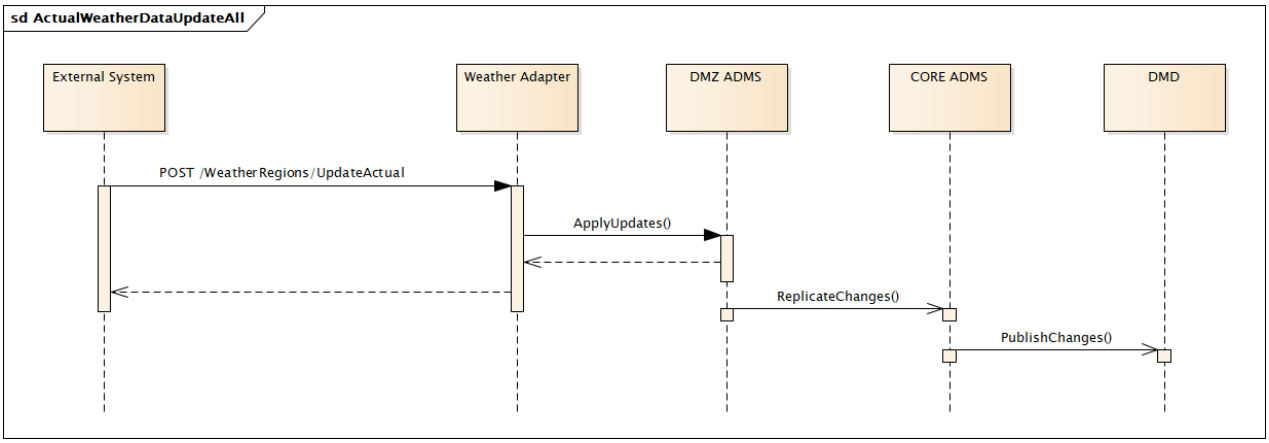

Figure 5.1 – The ActualWeatherDataUpdateAll operation execution

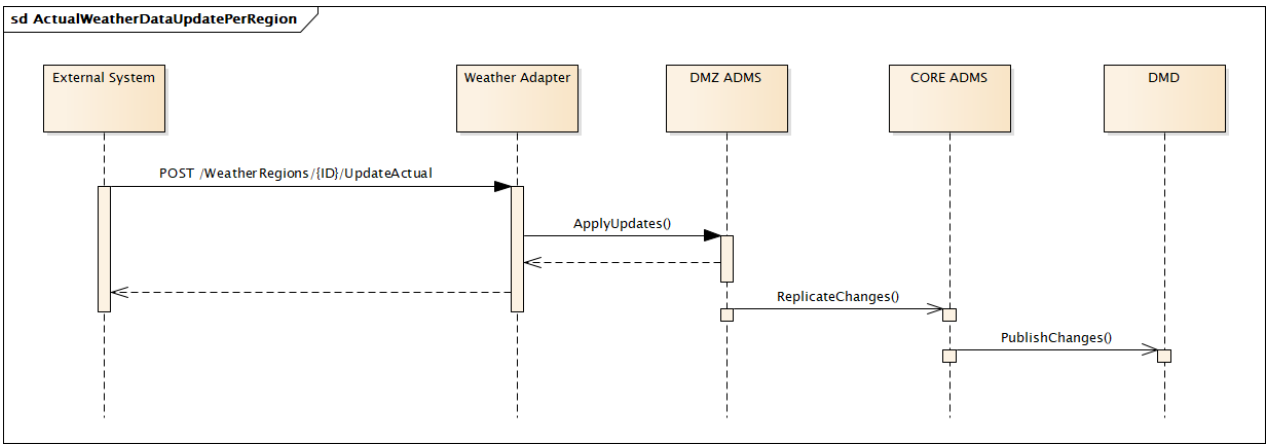

Figure 5.2 – The ActualWeatherDataUpdatePerRegion operation execution

Depending on the both stages of validation, the Weather Adapter returns the appropriate response or fault with the detailed explanation of the occurred error. Figure 5.1 and Figure 5.2 provide the visual representation for the described sequence of events both for SOAP and RESTful web service operation executions.

Besides the update of actual weather data, the Weather Adapter implements the logic for data staling of actual signal values. Through the mentioned functionality signal quality can be set to questionable, if updates were not received more than a configurable time period. Last update time will be set to date time now.

When request message with actual measurement is not received for a certain period, real-time measurement will not be updated. If the last update time of the signal value is older than configurable time interval, Weather Adapter sets the signal quality to questionable. Described logic is completely configurable and can be enabled/disabled within the adapter's configuration file.

Data staling is not applicable for forecast weather data.

5.1.2. Use Cases

The list of possible use cases and corresponding faults is given in Table 5.1.

Table 5.1 – The ActualWeatherDataUpdate operation use cases

Use Case	Message Mapping			Action
	Property	Type	Value	
Common: Successful actual weather data update	Result	String	OK	External system sends a request with valid actual weather data. Actual values of appropriate weather data signals are updated. Response message is sent by WDI Adapter with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
SOAP: Invalid Verb	Result	String	FAILED	External system sends request/event message with invalid Verb. Response message is sent by WDI Adapter with FAILED result and message is discarded.
	Error.code	String	2.9	
	Error.level	String	FATAL	
	Error.reason	String	InvalidVerb	
	Error.details	String	Verb {0} is not valid for requested operation.	
SOAP: Invalid Noun	Result	String	FAILED	External system sends request/event message with invalid Noun. Response message is sent by WDI Adapter with FAILED result and message is discarded.
	Error.code	String	2.5	
	Error.level	String	FATAL	
	Error.reason	String	InvalidNoun	
	Error.details	String	Noun {0} is not valid for requested operation.	
SOAP: Mandatory Element Missing	Result	String	FAILED	External system sends request/event message in which some of the mandatory elements are missing. Response message is sent by WDI Adapter with FAILED result and message is discarded.
	Error.code	String	1.8	
	Error.level	String	FATAL	

Use Case	Message Mapping			Action
	Property	Type	Value	
	Error.reason	String	InvalidMessage	
	Error.details	String	Received message is invalid against predefined schema. Reason: {0}.	
Common: Invalid weather region ID	Result	String	PARTIAL/FAILED	External system sends a request where one or more weather regions do not exist. For existing weather regions actual weather data are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with bad request result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	EntityNotFound	
	Error.details	String	Invalid Weather Region identifier(s): {0}	
Common: Missing weather region ID	Result	String	PARTIAL/FAILED	External system sends a request where one or more weather regions do not have mRID specified. For valid weather regions actual weather data are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with bad request result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	EmptyWeatherReagionMrid	
	Error.details	String	WeatherReagionMrid element is/are not provided.	
Common: Invalid measurement type	Result	String	PARTIAL/FAILED	External system sends a request where for one or more weather regions, some of the actual weather data has an invalid measurement type (unsupported weather measurement). Actual values for weather data with valid measurement types are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with bad request result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	InvalidMeasurementType	
	Error.details	String	Invalid measurement type(s): {0}	
Common: Invalid weather data timestamp (timestamp is greater than current datetime)	Result	String	OK	External system sends a request where for one or more weather regions, some of the actual weather data has a timestamp which is greater than current datetime. Timestamp is overridden by WDI adapter and actual values of appropriate weather data signals are updated. Response message is sent by WDI Adapter with OK result.
	Error.code	String	1.9	
	Error.level	String	WARNING	
	Error.reason	String	InvalidTimestamp	

Use Case	Message Mapping			Action
	Property	Type	Value	
	Error.details	String	Provided timestamp cannot be in future or less than last modified timestamp: {0}.	
Common: Missing weather data timestamp	Result	String	OK	External system sends a request where for one or more weather regions, some of the actual weather data does not have a timestamp. Timestamp is overridden to current datetime by WDI adapter and actual values of appropriate weather data signals are updated. Response message is sent by WDI Adapter with OK result.
	Error.code	String	1.9	
	Error.level	String	WARNING	
	Error.reason	String	MissingTimestamp	
	Error.details	String	Timestamp is missing for: {measurementType} and {weatherRegion}.	
Common: Invalid weather data value (out of range)	Result	String	PARTIAL/FAILED	External system sends a request where for one or more weather regions, some of the actual weather data has an invalid value (out of range). Actual values for weather data with valid values are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with bad request result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	ValueOutOfRange	
	Error.details	String	Value for: {0} in {1} region is out of range	
REST: Invalid attribute type	Result	String	PARTIAL/FAILED	External system sends a request where for one or more weather regions, some of the actual weather data attributes has an invalid type (datetime is in wrong format and cannot be converted). Actual values for weather data with valid values are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with bad request result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	InvalidType	
	Error.details	String	Invalid type for attribute: {0}.	
Common: Invalid Measurement Value Quality	Result	String	PARTIAL/FAILED	External system sends a request where for one or more weather regions, some of the actual weather data has INVALID (or QUESTIONABLE) validity. Actual values for weather data with valid values are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with bad request result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	InvalidQuality	

Use Case	Message Mapping			Action
	Property	Type	Value	
	Error.details	String	Invalid quality for: {measurementType} and region {weatherRegion}. Data will not be updated.	
Common: Missing Analog Values	Result	String	PARTIAL/FAILED	External system sends a request where for one or more weather regions do not have analog values specified. Actual values for weather data with valid values are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with bad request result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	MissingAnalogValues	
	Error.details	String	AnalogValues are missing for: {0} and {1}.	

5.2. Update Forecast Weather Data

5.2.1. Overview

Besides the actual weather data update, the Weather Adapter provides the functionality to update forecast weather data as well. In order to update forecast weather data, the external system needs to invoke the appropriate web service operation (SOAP or REST).

Once the request is received, the Weather Adapter performs initial validation of the received data, transforms it into the appropriate internal format and applies it to the DMZ system. Second level of validation is performed in software during the insertion of the weather data. All changes introduced to DMZ are asynchronously replicated to the CORE system.

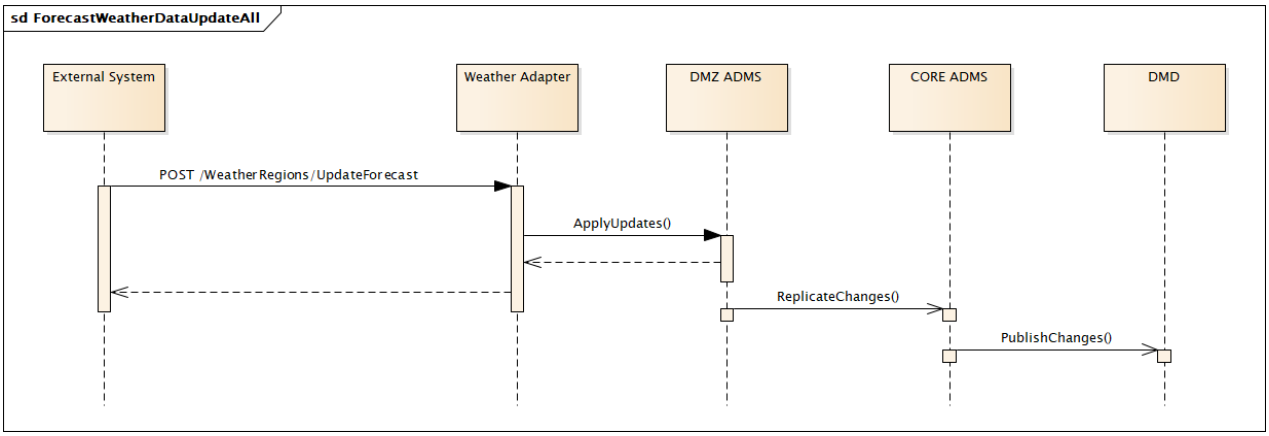

Figure 5.3 – The ForecastWeatherDataUpdateAll operation execution

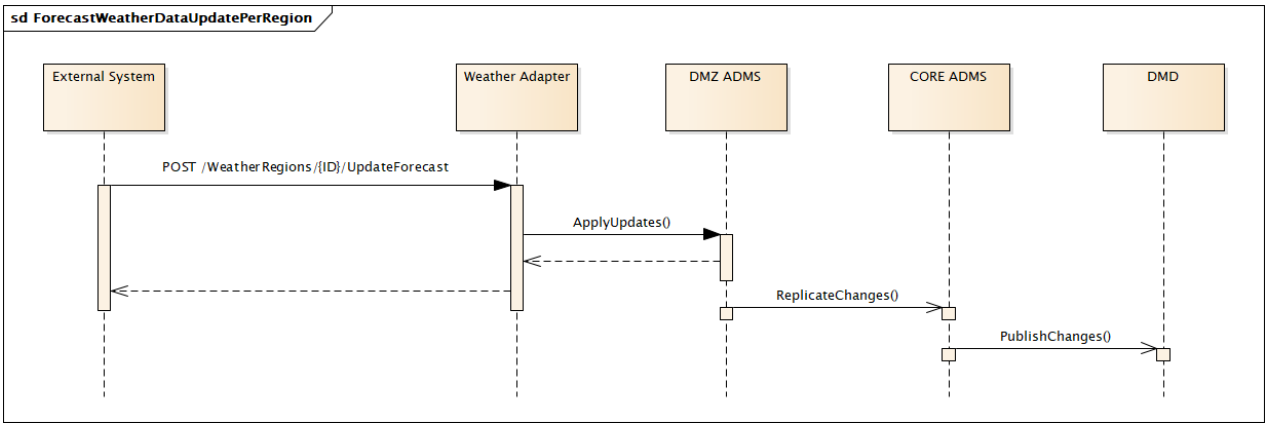

Figure 5.4 – The ForecastWeatherDataUpdatePerRegion operation execution

Depending on the both stages of validation, the Weather Adapter returns the appropriate response or fault with the detailed explanation of the occurred error. Figure 5.3 and Figure 5.4 provide the visual representation for the described sequence of events both for SOAP and RESTful web service operation executions.

5.2.2. Use Cases

The list of possible use cases and corresponding faults is given in Table 5.2.

Table 5.2 – The ForecastWeatherDataUpdate operation use cases

Use Case	Message Mapping			Action
	Property	Type	Value	
Common: Successful forecast weather data update	Result	String	OK	External system sends a request with valid forecast weather data. Forecast values of appropriate weather data signals are updated. Response message is sent by WDI Adapter with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
SOAP: Invalid Verb	Result	String	FAILED	External system sends request/event message with invalid Verb. Response message is sent by WDI Adapter with FAILED result and message is discarded.
	Error.code	String	2.9	
	Error.level	String	FATAL	
	Error.reason	String	InvalidVerb	
	Error.details	String	Verb {0} is not valid for requested operation.	
SOAP: Invalid Noun	Result	String	FAILED	External system sends request/event message with invalid Noun. Response message is sent by WDI Adapter with FAILED result and message is discarded.
	Error.code	String	2.5	
	Error.level	String	FATAL	
	Error.reason	String	InvalidNoun	
	Error.details	String	Noun {0} is not valid for requested operation.	
SOAP: Mandatory Element Missing	Result	String	FAILED	External system sends request/event message in which some of the mandatory elements are missing. Response message is sent by WDI Adapter with FAILED result and message is discarded.
	Error.code	String	1.8	
	Error.level	String	FATAL	

Use Case	Message Mapping			Action
	Property	Type	Value	
	Error.reason	String	InvalidMessage	
	Error.details	String	Received message is invalid against predefined schema. Reason: {0}.	
Common: Invalid weather region	Result	String	PARTIAL/FAILED	External system sends a request where one or more weather regions do not exist. For existing weather regions forecast weather data are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with PARTIAL/FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	EntityNotFound	
	Error.details	String	Invalid Weather Region mRID(s): {0}	
Common: Invalid weather region ID	Result	String	PARTIAL/FAILED	External system sends a request where one or more weather regions do not exist. For existing weather regions forecast weather data are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with bad request result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	EntityNotFound	
	Error.details	String	Invalid Weather Region identifier(s): {0}	
Common: Invalid measurement type	Result	String	PARTIAL/FAILED	External system sends a request where for one or more weather regions, some of the forecast weather data has an invalid measurement type (unsupported weather measurement). Forecast values for weather data with valid measurement types are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with PARTIAL/FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	InvalidMeasurementType	
	Error.details	String	Invalid measurement type(s): {0}	
Common: Missing weather data timestamp	Result	String	OK	External system sends a request where for one or more weather regions, some of the forecast weather data does not have a timestamp. Timestamp is overridden to current datetime for the first value by WDI adapter and forecast values of appropriate weather data signals are updated. Response message is sent by WDI Adapter with OK result.
	Error.code	String	1.9	
	Error.level	String	WARNING	
	Error.reason	String	MissingTimestamp	
	Error.details	String	Timestamp is missing for: {0} and {1}.	

Use Case	Message Mapping			Action
	Property	Type	Value	
Common: Invalid weather data value (out of range)	Result	String	PARTIAL/FAILED	External system sends a request where for one or more weather regions, some of the forecast weather data has an invalid value (out of range). Forecast values for weather data with valid values are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with PARTIAL/FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	ValueOutOfRange	
	Error.details	String	Value for: {0} in {1} region is out of range	
REST: Invalid attribute type	Result	String	PARTIAL/FAILED	External system sends a request where for one or more weather regions, some of the forecast weather data attributes has an invalid type (datetime is in wrong format and cannot be converted). Forecast values for weather data with valid values are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with bad request result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	InvalidType	
	Error.details	String	Invalid type for attribute: {0}.	
Common: Missing Analog Values	Result	String	PARTIAL/FAILED	External system sends a request where for one or more weather regions where analog values are not specified. Forecast values for weather data with valid values are updated, while for invalid ones' appropriate error is logged. Response message is sent by WDI Adapter with bad request result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	MissingAnalogValues	
	Error.details	String	AnalogValues are missing for: {0} and {1}.	

6. MESSAGES

6.1. ActualWeatherDataUpdate Operation Messages

The operation definition:

- SOAP:
  - ChangedActualWeatherDataResponse
  - ChangedActualWeatherData(ChangedActualWeatherDataEvent)
- REST:
  - POST /WeatherRegions/UpdateActual
  - POST /WeatherRegions/{id}/UpdateActual

6.1.1. Request

The *ChangedActualWeatherData e*vent message is defined according to the IEC 61968-100 standard and contains the following two sections:

- Header
- Payload

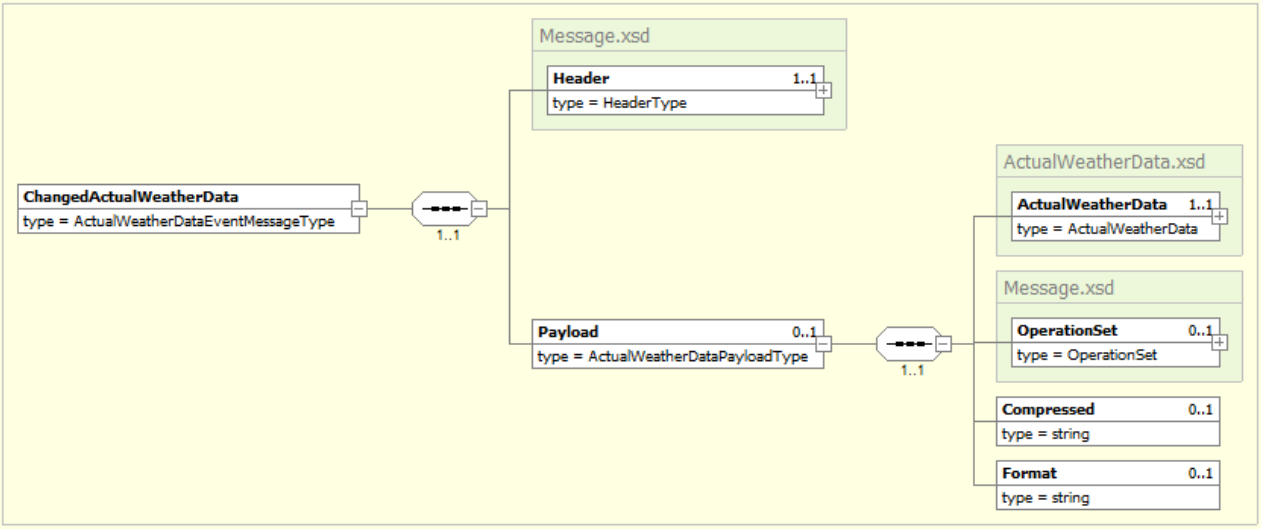

Figure 6.1 – The ChangedActualWeatherDataEvent message

The Payload section carries the CIM defined profile (*ActualWeatherData.xsd*) for update of actual weather data. The visual representation of the *ActualWeatherData.xsd* schema is given in Figure 6.2.

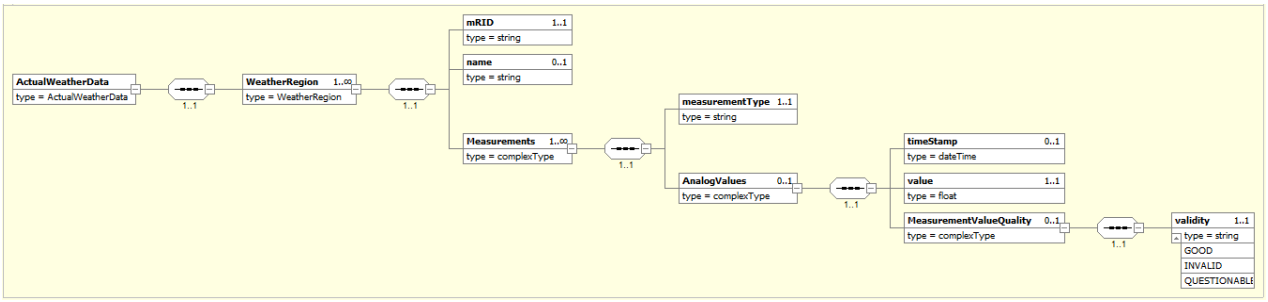

Figure 6.2 – ActualWeatherData.xsd

The JSON data representation is based on the same CIM profile. SOAP and JSON request message examples are specified within WSDL zip archive.

The mapping between the request message and the appropriate entities in the model is given in Table 6.1.

Table 6.1 – The ActualWeatherData request message → the model mapping

Request Message		Description	Model	
Property	Type		Property	Type
Header.**Verb**	String	Verb is changed.	Populated by external system only for SOAP WS	N/A
Header.**Noun**	String	Noun is ActualWeatherData.	Populated by external system only for SOAP WS	N/A
Header.Revision	String	Default value is 2.0.	Populated by external system only for SOAP WS	N/A
Header.**TImestamp**	DateTime	Timestamp when message was produced.	Populated by external system only for SOAP WS	N/A
Header.Source	String	Source system or application that sends the message.	Populated by external system only for SOAP WS	N/A
Header.**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by external system only for SOAP WS	N/A
Header.CorrelationID	String	Same as message ID.	Populated by external system only for SOAP WS	N/A
WeatherRegion.mRID	String	Unique identifier for the weather region. Adapter verifies the existence based on this attribute which can be mapped to one of the values from model: customID or name	IDOBJ_CUSTOMID IDOBJ_NAME	String
WeatherRegion.name	String	Name of the weather region.	IDOBJ_NAME	String
MeasurementType	String	Measurement type: Humidity (%), Temperature (°C), Insolation [W/m2], FeelsLike (°C), WindSpeed (km/h), WindDirection (Degree), SkyCover (%), Precipitation (mm)	MEASUREMENT_TYPE	Enum
Timestamp	DateTime	Timestamp of the weather data.	SIGVAL_TIMESTAMP	DateTime
Value	String	Value of the weather data. If specified in unit other than the one used in EcoStruxure GridOps (adapter's configuration), appropriate	ASIGVAL_VALUE	Float

Request Message		Description	Model	
Property	Type		Property	Type
		unit conversion is executed to the EcoStruxure GridOps default unit.		
Validity	String	Quality of the weather data: GOOD, INVALID, QUESTIONABLE.	SIGVAL_QUALITY	Enum

6.1.2. Response

After the actual weather data are updated, the appropriate response is returned to the calling system. A format of the response message is given in Figure 6.3.

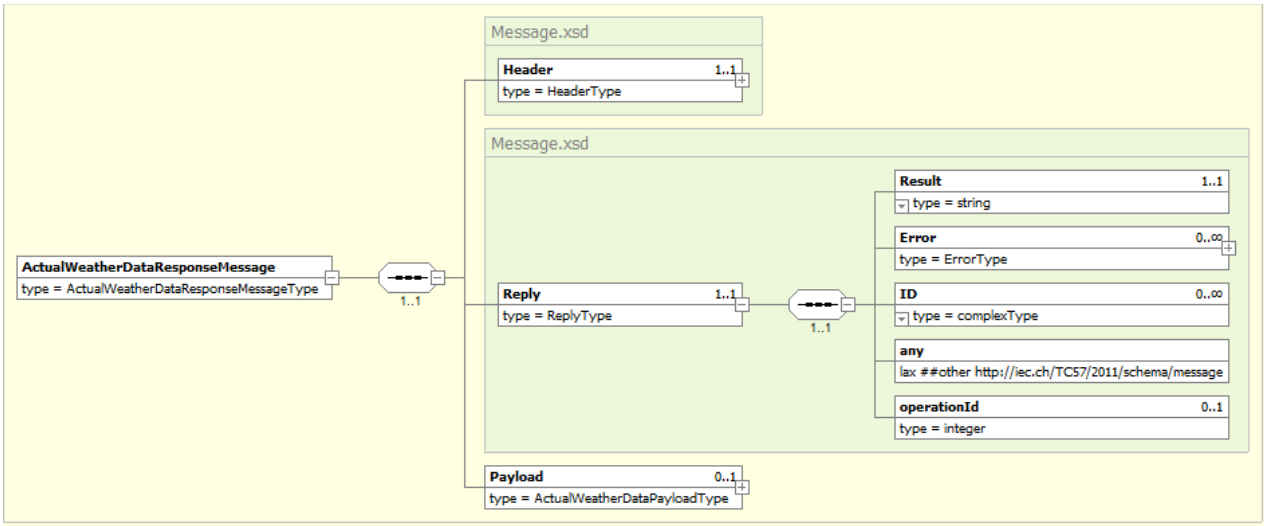

Figure 6.3 – The ActualWeatherDataResponse message

6.1.3. Fault

In situations when the internal server error occurs on the EcoStruxure GridOps side, the fault message is returned to the calling system.

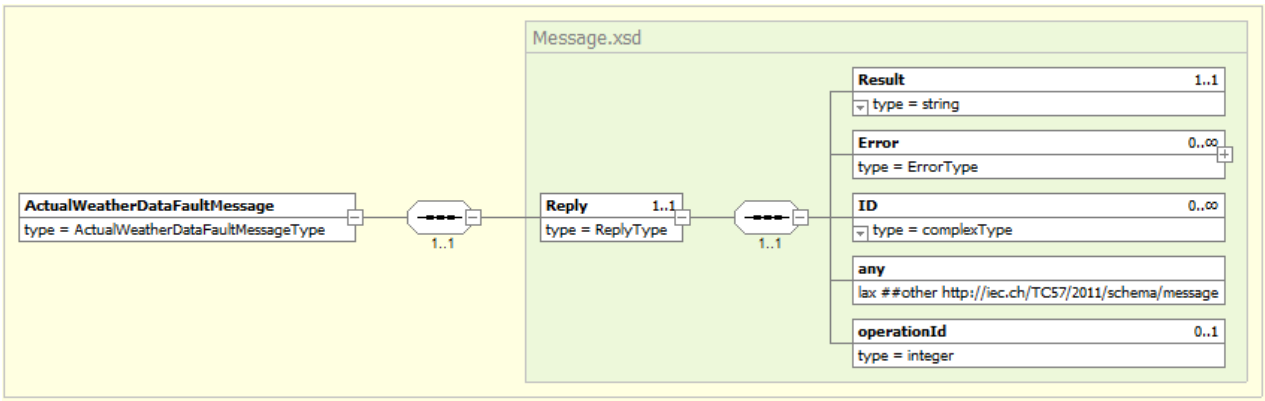

Figure 6.4 – The ActualWeatherDataFault message

6.2. ForecastWeatherDataUpdate Operation Messages

The operation definition:

- SOAP:
  - ChangedForecastWeatherDataResponse
  - ChangedForecastWeatherData(ChangedForecastWeatherDataEvent)
- REST:
  - POST /WeatherRegions/UpdateForecast
  - POST /WeatherRegions/{id}/UpdateForecast

6.2.1. Request

The *ChangedForecastWeatherData* event message is defined according to the IEC 61968-100 standard and contains the following two sections:

- Header
- Payload

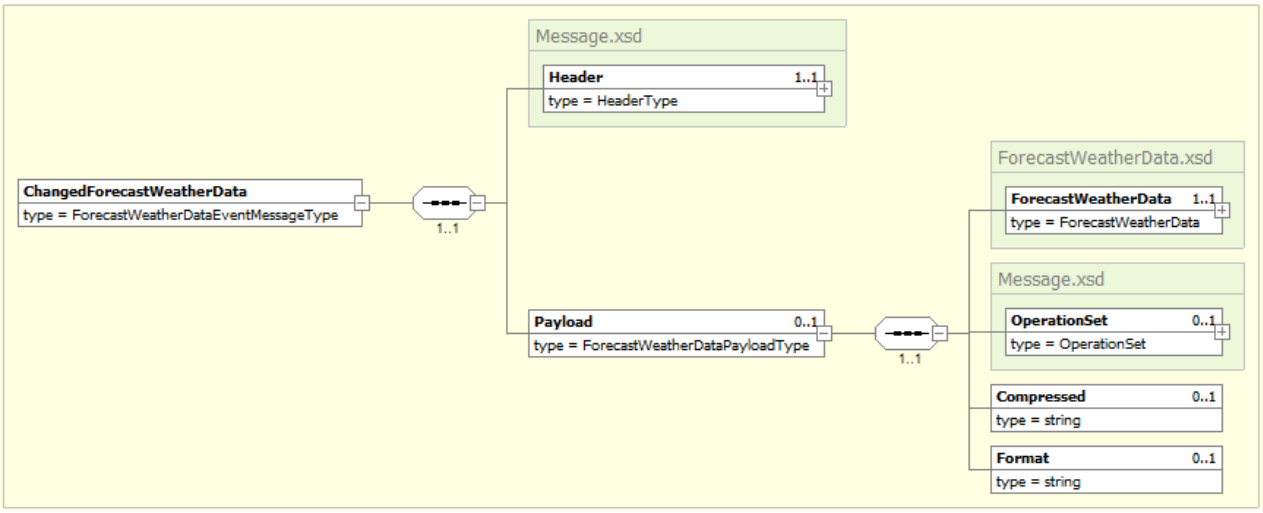

Figure 6.5 – The ChangedForecastWeatherDataEvent message

The Payload section carries the CIM defined profile (*ForecastWeatherData.xsd*) for update of forecast weather data. The visual representation of the *ForecastWeatherData.xsd* schema is given in Figure 6.6.

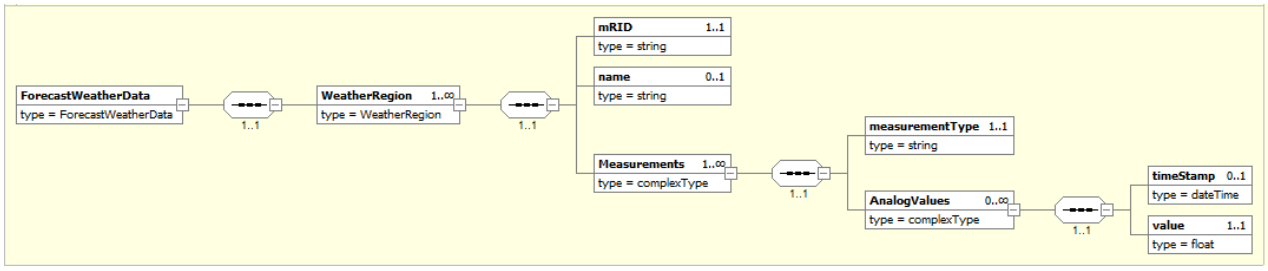

Figure 6.6 – ForecastWeatherData.xsd

The JSON data representation is based on the same CIM profile. SOAP and JSON request message examples are specified within WSDL zip archive.

Table 6.2 defines the mapping between the request message and the appropriate entities in the model.

Table 6.2 – The ForecastWeatherData request message → the model mapping

Request Message		Description	Model	
Property	**Type**		**Property**	**Type**
Header.**Verb**	String	Verb is changed.	Populated by external system only for SOAP WS	N/A
Header.**Noun**	String	Noun is ForecastWeatherData.	Populated by external system only for SOAP WS	N/A
Header.Revision	String	Default value is 2.0.	Populated by external system only for SOAP WS	N/A
Header.**TImestamp**	DateTime	Timestamp when message was produced.	Populated by external system only for SOAP WS	N/A
Header.Source	String	Source system or application that sends the message.	Populated by external system only for SOAP WS	N/A
Header.**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by external system only for SOAP WS	N/A
Header.CorrelationID	String	Same as message ID.	Populated by external system only for SOAP WS	N/A
WeatherRegion.mRID	String	Unique identifier for the weather region. Adapter verifies the existence based on this attribute which can be mapped to one of the values from model: customID or name	IDOBJ_CUSTOMID IDOBJ_NAME	String
WeatherRegion.name	String	Name of the weather region.	IDOBJ_NAME	String
MeasurementType	String	Measurement type: Humidity (%), Temperature (°C), Insolation [W/m2], FeelsLike (°C), WindSpeed (km/h), WindDirection (Degree), SkyCover (%), Precipitation (mm)	MEASUREMENT_TYPE	Enum
Timestamp	DateTime	Timestamp of the initial (first) forecast weather data.	SIGVAL_TIMESTAMP	DateTime
Value	String	Value of the weather data. If specified in unit other than the one used in EcoStruxure GridOps (adapter's configuration), appropriate unit conversion is executed to the EcoStruxure GridOps default unit.	ASIGVAL_VALUE	Float

6.2.2. Response

After the forecast weather data are updated, the appropriate response is returned to the calling system. A format of the response message is given in Figure 6.7.

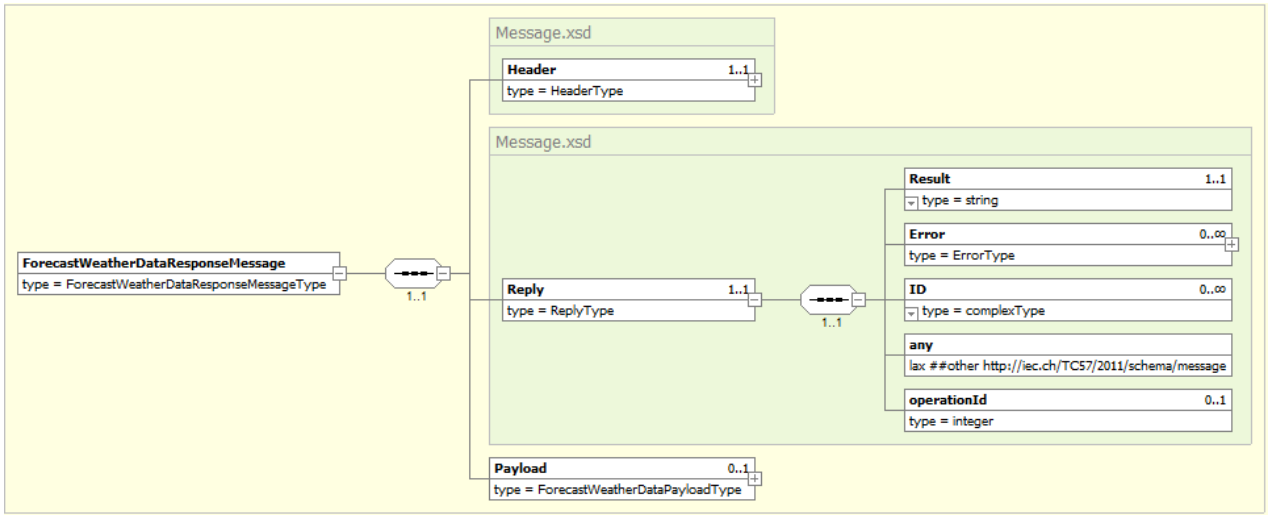

Figure 6.7 – The ForecastWeatherDataResponse message

6.2.3. Fault

In situations when the internal server error occurs on the EcoStruxure GridOps side, the fault message is returned to the calling system.

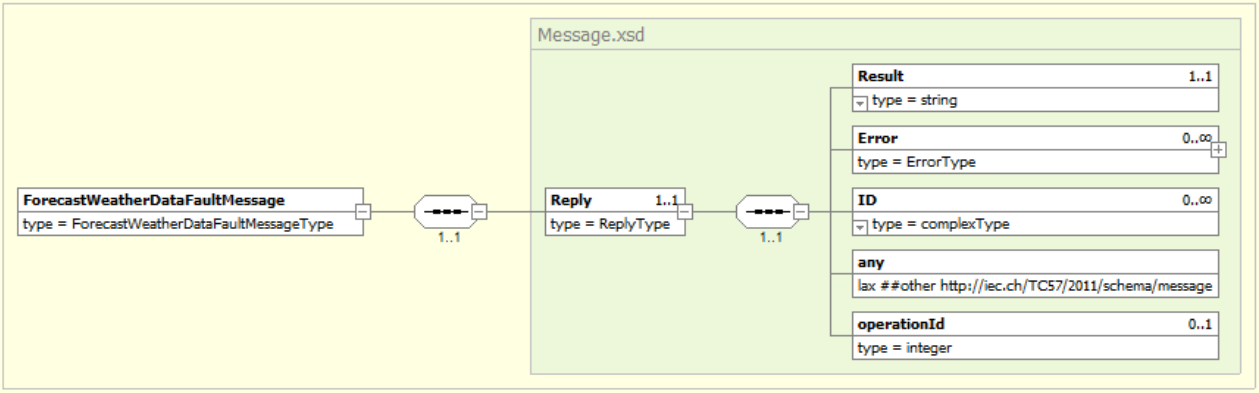

Figure 6.8 – The ForecastWeatherDataFault message

7. DEPLOYMENT SPECIFICATION

It is thoroughly described in the *EcoStruxure GridOps Management Suite 3.10 Enterprise Integration Platform - Functional Specification* [1].

The deployment specification is provided in the following table:

Table 7.1 – The deployment specification

Deployment Specification	
Application	WDIAdapter
Critical process	No
OASyS service	OASyS DNA DMS_INTEGRATION Service
Servers	pdmz-int-1, pdmz-int-2, bdmz-int-1, bdmz-int-2
Zone	pdmz, bdmz
Installation Type	Product
Installation add-on name	Integration Adapters

8. INTERFACE CONFIGURATION

WDI adapter provides certain amount of configurability so that smaller adjustments in the functionality can be easily applied to the system, without interface down time. Such feature is provided through dedicated configuration files of the WDI adapter. Initially, following configuration files are used the adapter:

Table 8.1 – The configuration files specification

Name of the config file	Configuration File Description
AdapterWDI	Registry configuration xml file
ErrorConfiguration_WeatherAdapter	Error configuration xml file
AdapterWDI_WebServiceConfiguration	Web service configuration xml file

For more details about adapters configuration files refer to the *EcoStruxure GridOps Management Suite 3.10 Enterprise Integration Platform - Functional Specification* [1].

Detailed content of above-mentioned configuration files is provided within the *Configuration* folder in the *EcoStruxure GridOps Management Suite 3.10 Weather Interface.zip* file [2].

9. APPENDIX

9.1. WSDL

The WSDL file and XSD schemas defined according to the IEC61968-9 and IEC 61968-100 for the Weather web services are provided within the *Web Service Definitions* folder in the *EcoStruxure GridOps Management Suite 3.10 Weather Interface.zip* file [2].

9.2. Message Examples

Message examples for several use cases are provided within the *Message Examples* folder in the *EcoStruxure GridOps Management Suite 3.10 Weather Interface.zip* file [2].

9.3. Network Model Population

The network model entity called the Weather Region is used to model weather data station and implicitly, through Weather Region → Substation association, model geographic area covered by a weather station.

Weather regions are introduced into the model through the Network Builder application which is used to introduce changes into the network model. Analog and array signals used to represent actual and forecasted weather data values are also introduced into the Network Model by using the Network Builder application.

In order to populate the model accurately, a person who uses the NB needs to have the information about the available weather stations in the area that is covered by utility's distribution network. Also, relationship between the weather region (weather station) and distribution substation needs to be defined during the network model population process. In order to do this, the mapping between weather regions and utility distribution substations needs to be created. Mapping needs to be provided by the utility.

10. RELEASE NOTES

The following new features related to Product WDI Interfaces were introduced in the software, starting from version 3.8 MHF.

10.1. Software Version 3.8 MHF

Feature	Description
Staling weather data	Capability for staling of weather data is added in cases where weather data is not updated for longer than configurable time period.

11. DEFINITIONS AND ABBREVIATIONS

Definition/Abbreviation	Description
ADMS	Advanced Distribution Management System
CIM	Common Information Model
DMD	Dynamic Mimic Diagram
DMZ	Demilitarized Zone
ESB	Enterprise Service Bus
NB	Network Builder
REST	Representational State Transfer
SOAP	Simple Object Access Protocol
WCF	Windows Communication Foundation
WDI	Weather Data Integration
WS	Web Service
XML	Extensible Markup Language
XSD	XML Schema Definition