GridOps Management Suite 3.10

Customer Relationship Management Interface

Functional Specification

Document Version: 1.2

Updated: June, 2024

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 Outage Management - Functional Specification	The document describes the Outage Management component. The Outage Management functionality tracks all information about the power disturbances in the network and organizes the response to the disturbance into a user-friendly, efficient and safe workflow.
2.	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.
3.	EcoStruxure GridOps Management Suite 3.10 Customer Relationship Management Interface	EcoStruxure GridOps Management Suite 3.10 Customer Relationship Management Interface zip file contains essential configuration information, as well as web service definitions complemented with message examples.

2. ASSUMPTIONS AND PREREQUISITES

The Customer Relationship Management integration is designed under the following assumptions:

- EcoStruxure GridOps system is the leading system responsible for entire life cycle of all outage management entities (trouble tickets, incidents, callbacks, etc.).
- Users of external systems have possibility to report trouble by inserting trouble tickets in the EcoStruxure GridOps.
- When inserting trouble tickets from the external system, users can specify the trouble ticket ID that needs to be unique. External system is responsible for providing unique IDs during insertion of trouble tickets. EcoStruxure GridOps will not validate the uniqueness of these IDs. If this assumption is not met, operations related to changing and querying trouble tickets might not work as designed.
- Users of external systems have possibility to pull the appropriate outage management data from the EcoStruxure GridOps for various reporting reasons.
- Message exchange is supported utilizing two integration patterns: publish/subscribe and request/reply.
- Since the outage management functionality is highly configurable, the appropriate types (enumerations such as hazard codes, outage codes, incident codes, trouble codes, trouble ticket sources, callback results, etc.) that need to be exchanged between external systems and the EcoStruxure GridOps must be defined during design sessions.

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 the following solutions: EcoStruxure ADMS and EcoStruxure Grid Operation.

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.

In the distribution network, where the number of telemetered devices is significantly small comparing to the network size, trouble tickets present the main notification that disturbance in the network exists. Trouble tickets can be collected through various sources:

- Call Center
- IVR
- Outage Portals

The collected data from external systems is sent to the EcoStruxure GridOps in form of trouble ticket. Trouble tickets can be classified as customer (service delivery point is specified), landbase (landbase data is specified) and location (coordinates are specified) trouble tickets. All three types of trouble tickets are handled through one interface exposed. Once the trouble has been reported and trouble ticket entered in the EcoStruxure GridOps, appropriate incident is created. During trouble inspection by the field crew there is a need to forward valuable information from the field, to operators in control room. In order to support aforementioned requirement, the CRM Interface delivers such feature through operation for trouble ticket update, where important information is forwarded in a form of trouble ticket comment.

Following on incident resolution, for customers that requested a callback, the system creates callbacks (For more information about the callback management, see *EcoStruxure GridOps Management Suite 3.10 Outage Management - Functional Specification* document [1]*)*. Generated callbacks are available to the Call Center so that the CSR can pull the first available callback from the EcoStruxure GridOps and later update the same callback with the appropriate result. Another feature available through the CRM Interface is sending callbacks for customers of the appropriate priority to IVR so they can be resolved automatically.

Besides aforementioned functionalities related to the insertion of trouble tickets, the CRM Interfaces provides wide range of reporting functionalities, related to the trouble ticket data. The dedicated operation enables pulling of the active and archived (historical) trouble ticket information.

Common business processes implemented within the CRM Interface are shown in Figure 3.1.

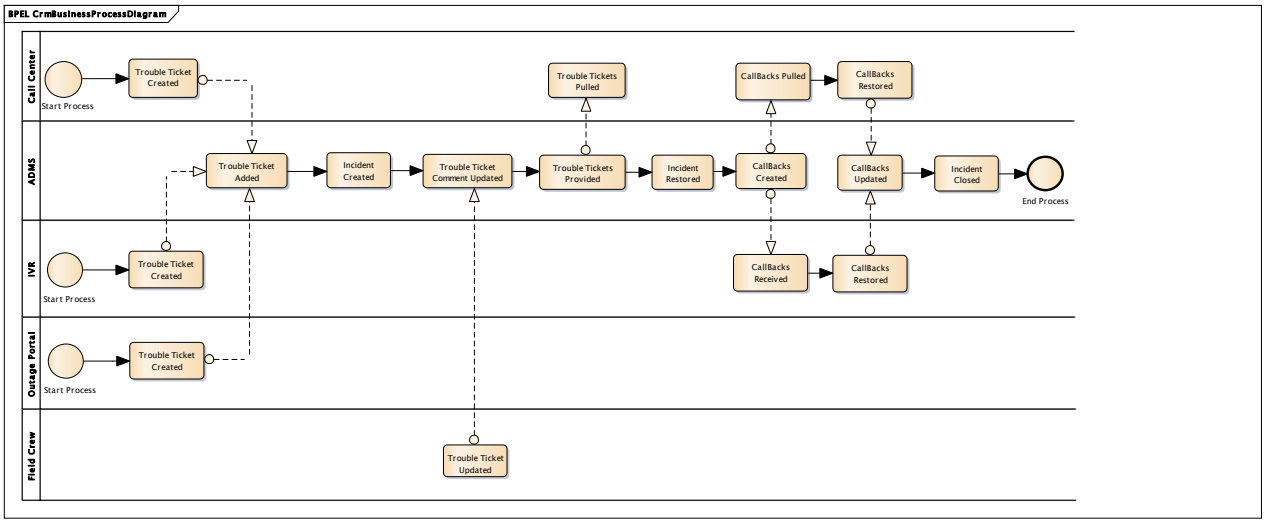

Figure 3.1 – Common business processes within the CRM Integration

In case of a power loss, customer reports a trouble ticket through the Call Center, Outage Portal or IVR system. The Customer Service Representative creates the trouble ticket and sends it to the EcoStruxure GridOps. Based on the received trouble tickets a new incident/s is/are created. If various means of reporting are needed, currently active and/or archived trouble tickets can be pulled from the EcoStruxure GridOpsby external system. Depending on the agreed business process, crew dispatching can be performed either from the EcoStruxure GridOps or External Dispatching System (EDS). Once the crew is dispatched and the problem in the field is resolved, incident is being restored, which results in the callback creation for the customers who requested the callback. CSRs pull the callbacks from the EcoStruxure GridOps and inform appropriate customers about the power restoration. After all callbacks for one incident are closed, incident is closed as well. Also, CRM Adapter can publish callbacks to IVR system, for customers of appropriate priority, in order for them to be resolved automatically.

3.1. General Architecture

It is thoroughly described in the *EcoStruxure GridOps Management Suite 3.10 Enterprise Integration Platform - Functional Specification* document [2].

4. INTERFACE OVERVIEW

The Customer Relationship Management interface is implemented through the CRM Adapter component. The aforementioned adapter implements (hosts) several SOAP based Web Services with the appropriate set of operations and behaves as Web Service Client:

- ReceiveTroubleTicketsService – used for creating and updating trouble tickets:
  - CreatedTroubleTickets operation
  - ChangedTroubleTickets operation
- GetTroubleTicketsService – used for pulling active and archived trouble tickets:
  - GetTroubleTickets operation
- GetCallBacksService – used for pulling active callbacks:
  - GetCallBacks operation
- ReceiveCallBacksResultsService – used for receiving callback results:
  - CreatedCallBacksResults operation
- SendCallBacksClient – used for sending callbacks to the external system:
  - SendCallBacks operation

The following chapters provide more details regarding these interfaces (web services) and the appropriate web service operations, data mappings (CIM Profiles → Outage Model), error handling scenarios etc.

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

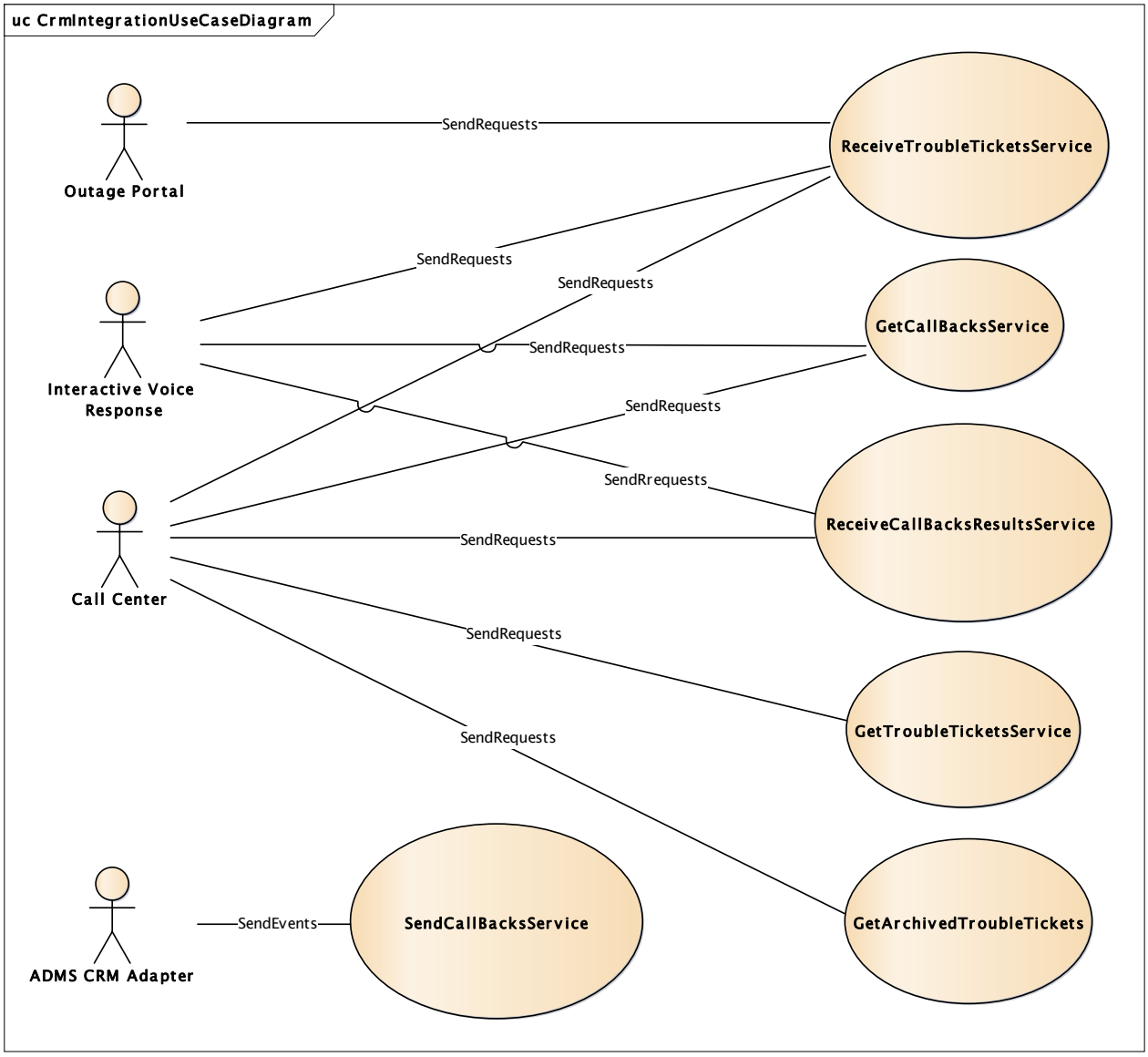

Figure 4.1 – The CRM Integration use case diagram

5. RECEIVETROUBLETICKETS SERVICE

5.1. CreatedTroubleTickets Operation

5.1.1. Overview

As stated above, trouble tickets are usually entered through external system (source). In order to insert collected trouble ticket data into the EcoStruxure GridOps, the *CreatedTroubleTicketsEvent* object needs to be created and sent to the CRM Interface. The CSR collects all necessary information and enters it into the CTA which forms aforementioned object and forwards it to the CRM Interface.

The CRM Adapter performs initial validation of the received data, transforms it into the appropriate internal format and applies it into DMZ system. The second level of validation is performed during the insertion of the trouble ticket. All changes introduced to the DMZ are asynchronously replicated to the CORE system.

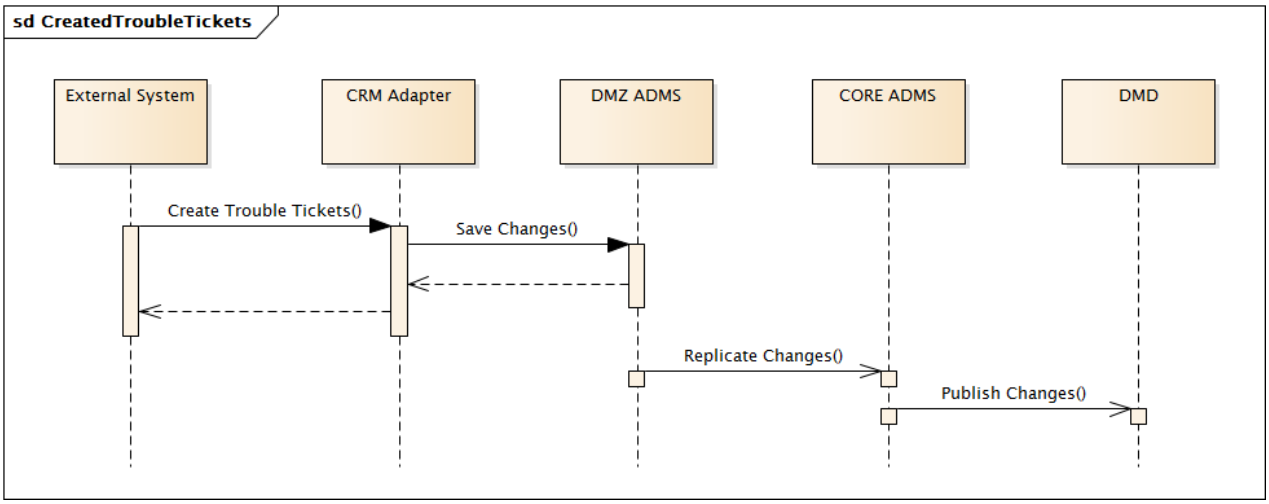

Figure 5.1 – The CreatedTroubleTickets operation execution

Depending on the both stages of validation, the CRM Adapter returns the appropriate *CreatedTroubleTicketsResponse* or *CreatedTroubleTicketsFault* with the detailed explanation of the occurred error. Figure 5.1 provides the visual representation for the described sequence of events.

Since *ReceiveTroubleTickets* service is implemented as a highly scalable service, it can be also used for insertion of trouble tickets into the EcoStruxure GridOps collected by the IVR system. Trouble tickets are grouped into one message and forwarded as a collection to the CRM Adapter which sequentially processes them. All of the valid trouble tickets are inserted into DMZ system, while for invalid ones the appropriate error is defined and returned within the *CreatedTroubleTicketsResponse* object.

5.1.2. Use Cases

The list of possible use cases and corresponding faults is given in Table 5.1. Common use cases such as *Invalid Verb, Invalid Noun, Mandatory Element Missing, Element not found in message, Unable to process the request* and *Non-active site fault* are described only in this table. For all other operations, it is only mentioned that they are applicable while whole description is omitted.

Table 5.1 – The CreatedTroubleTickets operation use cases

Use Case	Message Mapping			Action
	Property	Type	Value	
Invalid Verb	Result	String	FAILED	External system sends CreatedTroubleTickets message with invalid Verb. Response message is sent by CRM Adapter with FAILED result and message is discarded.
	Error.code	String	2.9	
	Error.level	String	FATAL	
	Error.reason	String	InvalidVerb	
	Error.details	String	Invalid verb: {0}.	
Invalid Noun	Result	String	FAILED	External system sends CreatedTroubleTickets message with invalid Noun. Response message is sent by CRM Adapter with FAILED result and message is discarded.
	Error.code	String	2.5	
	Error.level	String	FATAL	
	Error.reason	String	InvalidNoun	
	Error.details	String	Invalid noun: {0}.	
Mandatory Element Missing	Result	String	FAILED	External system sends CreatedTroubleTickets message in which some of the mandatory elements are missing. Response message is sent by CRM Adapter with FAILED result and message is discarded.
	Error.code	String	1.8	
	Error.level	String	FATAL	
	Error.reason	String	InvalidMessage	
	Error.details	String	Received message is invalid against xsd schema. Reason: {0}.	
Unable to process the request	Result	String	FAILED	

Use Case	Message Mapping			Action
	Property	Type	Value	
	Error.code	String	5.3	External system sends CreatedTroubleTickets message, but for some reason message processing fails due to various internal server error. Fault response message is sent by CRM Adapter.
	Error.level	String	FATAL	
	Error.reason	String	InternalServerError	
	Error.details	String	{0}.	
Created TroubleTickets – Customers are Not Affected by an Existing Incidents	Result	String	OK	External system sends CreatedTroubleTickets message for customers that are not affected by an existing outage. New Trouble Ticket is created in EcoStruxure GridOps. Response message is sent by CRM Adapter with OK result and populated TroubleTicket.mRID and UsagePoint.mRID (only for customer based calls).
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Created TroubleTickets – Customers are Affected by an Existing Incidents	Result	String	OK	External system sends CreatedTroubleTickets message for customers that are affected by an existing confirmed outage. New Trouble Tickets are created. Response message is sent by CRM Adapter with OK result and basic incident information.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Created TroubleTickets – Customers do not exist in model	Result	String	OK	External system sends CreatedTroubleTickets message for customers that do not exists in model. New (Unlocated) Trouble Tickets are created. Response message is sent by CRM Adapter with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Created TroubleTickets – Trouble Tickets do not contain UsagePoint.mRID, Location and PositionPoint	Result	String	OK	External system sends CreatedTroubleTickets message where several trouble tickets do not contain UsagePoint.mRID, Location information and PositionPoint. New (Unlocated) Trouble Tickets are created. Response message is sent by CRM Adapter with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	

Use Case	Message Mapping			Action
	Property	Type	Value	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Created TroubleTickets – Trouble Tickets contain UsagePoint.mRID and Location or PositonPoint	Result	String	OK	External system sends CreatedTroubleTickets message where every trouble ticket contains both UsagePoint.mRID and Location or PositionPoint. All trouble tickets from request message are processed where besides UsagePoint.mRID, location or PositionPoint data is inserted. Response message is sent by CRM Adapter with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Created TroubleTickets – Trouble Tickets contain Location and position point attributes.	Result	String	OK	External system sends CreatedTroubleTickets message where some trouble tickets carry both location and position point information. Trouble ticket is submitted based on location information, where new position point is retrieved form Landbase service based on the provided location search criteria. Position point from request message will not affect trouble ticket creation. Response message is returned by CRM adapter with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Created TroubleTickets – Comment Exceeds Limits	Result	String	OK	External system sends CreatedTroubleTickets message where several trouble tickets have comments that exceed limit. All trouble tickets are created while for the ones that have comment that exceeds limit, comment is shortened. Response message is sent by CRM Adapter with OK result.
	Error.code	String	2.7	
	Error.level	String	WARNING	
	Error.reason	String	CommentExceedsLimit	
	Error.details	String	Comment exceeds limit for trouble ticket(s): {0}	
Created TroubleTickets – Invalid Hazard Type	Result	String	OK	External system sends CreatedTroubleTickets message where several trouble tickets have invalid hazard type. Valid trouble tickets are processed, while for invalid ones, hazard type is omitted. Response message is sent by CRM Adapter with OK result.
	Error.code	String	2.7	
	Error.level	String	WARNING	
	Error.reason	String	InvalidHazardType	
	Error.details	String	Invalid hazard type(s): {0} for trouble ticket(s): {1}	
Created TroubleTickets –	Result	String	PARTIAL/FAILED	

Use Case	Message Mapping			Action
	Property	Type	Value	
Invalid Trouble Code	Error.code	String	2.7	External system sends CreatedTroubleTickets message where several trouble tickets have invalid trouble code. Valid trouble tickets are processed, while for invalid ones appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result.
	Error.level	String	FATAL	
	Error.reason	String	InvalidTroubleCode	
	Error.details	String	Invalid trouble code: {0} for trouble ticket(s): {1}.	
Created TroubleTickets – Missing Trouble Code	Result	String	PARTIAL/FAILED	External system sends CreatedTroubleTickets message where several trouble tickets do not have trouble code specified. Valid trouble tickets are processed, while for invalid ones appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	MissingTroubleCode	
	Error.details	String	Trouble code missing for trouble ticket(s): {1}.	
Created TroubleTickets – Invalid Language ID	Result	String	OK	External system sends CreatedTroubleTickets message where several trouble tickets have invalid language ID. Valid trouble tickets are processed, while for invalid ones language id is defaulted to English. Response message is sent by CRM Adapter with OK result.
	Error.code	String	2.7	
	Error.level	String	WARNING	
	Error.reason	String	InvalidLanguageId	
	Error.details	String	Invalid language ID(s): {0} for trouble ticket(s): {1}	
Created TroubleTickets – Invalid Call Source	Result	String	OK	External system sends CreatedTroubleTickets message where several trouble tickets have invalid call source. Valid trouble tickets are processed, while for invalid ones call source is defaulted to Unknown. Response message is sent by CRM Adapter with OK result.
	Error.code	String	2.7	
	Error.level	String	WARNING	
	Error.reason	String	InvalidCallSource	
	Error.details	String	Invalid call source(s): {0} for trouble ticket(s): {1}	
Created TroubleTickets – CallBack Period Start and End DateTime in Past	Result	String	OK	External system sends CreatedTroubleTickets message where several trouble tickets have callback period start or end datetime in the past. Valid trouble tickets are processed, while for invalid ones callback period will not be imported. Response message is sent by CRM Adapter with OK result.
	Error.code	String	2.7	
	Error.level	String	WARNING	
	Error.reason	String	CallBackPeriodEndDateTimeInPast	

Use Case	Message Mapping			Action
	Property	Type	Value	
	Error.details	String	Callback period end date time is in past for trouble ticket(s): {0}.	
Created TroubleTickets – CallBack Period EndTime is before StartTime	Result	String	OK	External system sends CreatedTroubleTickets message where several trouble tickets have callback period end time before start time. Valid trouble tickets are processed, while for invalid ones callback period will not be imported. Response message is sent by CRM Adapter with OK result.
	Error.code	String	2.7	
	Error.level	String	WARNING	
	Error.reason	String	InvalidPeriod	
	Error.details	String	Period: {0} is invalid. End date time is less than start date time.	
Created TroubleTickets – Landbase Location Type Not Supported	Result	String	OK/PARTIAL/FAILED	External system sends CreatedTroubleTickets message where several trouble tickets have location type which is not supported (non-existing). Valid trouble tickets are processed, while for trouble tickets that do not have valid location type, unlocated call will be created. Response message is sent by CRM Adapter with OK result.
	Error.code	String	2.7	
	Error.level	String	INFORM	
	Error.reason	String	LocationTypeNotSupported	
	Error.details	String	Landbase search type {0} is not supported by landbase search configuration	
Created TroubleTickets – Location Coordinate X/Y is Invalid	Result	String	OK	External system sends CreatedTroubleTickets message where several trouble tickets have location coordinates (X or Y) invalid. Valid trouble tickets are processed, while for trouble tickets that do not have valid location coordinates, unlocated call will be created. Response message is sent by CRM Adapter with OK result.
	Error.code	String	2.5	
	Error.level	String	WARNING	
	Error.reason	String	InvalidPositionPoint	
	Error.details	String	{0} coordinate of the position point {1} is not valid.	
Created TroubleTickets – CallBack Period Missing	Result	String	OK	External system sends CreatedTroubleTickets message where several trouble tickets do not have callback periods specified. Valid trouble tickets are processed, while for the ones where callback period is not specified, trouble ticket without callback period will be imported. Response message is sent by CRM Adapter with OK result. Note:
	Error.code	String	2.7	
	Error.level	String	INFORM	
	Error.reason	String	CallBackPeriodMissing	

Use Case	Message Mapping			Action
	Property	Type	Value	
	Error.details	String	Callback period element not found in message for trouble ticket(s): {0}.	If in CreatedTroubleTickets message from external system, callback is not required the adapter will not validate callback period. In this case it will not return a CallBackPeriodMissing error in response.
Created TroubleTickets – Location Names do not Meet Search Type Criteria	Result	String	OK/PARTIAL/FAILED	External system sends CreatedTroubleTickets message where several trouble tickets have location names that do not exist as search criteria. Valid trouble tickets are processed, while for the invalid ones unlocated call will be created. Response message is sent by CRM Adapter with OK result.
	Error.code	String	2.7	
	Error.level	String	WARNING	
	Error.reason	String	InvalidSearchTypeParamsNames	
	Error.details	String	Landbase search type parameters are not valid for defined search type.	
Created TroubleTickets – Invalid Contact Detail (callback media)	Result	String	PARTIAL/FAILED	External system sends CreatedTroubleTickets message where several trouble tickets have invalid callback media (contact detail). Valid trouble tickets are processed, while for the invalid ones, call will be created without invalid callback media. Response message is sent by CRM Adapter with OK result.
	Error.code	String	1.2	
	Error.level	String	FATAL	
	Error.reason	String	InvalidContactDetail	
	Error.details	String	Invalid contact detail {0} for trouble ticket(s): {1}.	
Created TroubleTickets – CreatedDateTime is in the future	Result	String	OK	External system sends CreatedTroubleTickets message with created date time in the future. New trouble ticket is created and created date time is defaulted to date time now. Adapter sends warning message to external system with information that created date time is in the future.
	Error.code	String	2.5	
	Error.level	String	WARNING	
	Error.reason	String	InvalidCreatedDateTime	
	Error.details	String	Created date time is in future for trouble ticket: {1}.	
Created TroubleTickets –	Result	String	OK	External system sends CreatedTroubleTickets message with populated valid landbase search type and search criteria. Since landbase service is down, adapter cannot obtain
	Error.code	String	N/A	
	Error.level	String	N/A	

Use Case	Message Mapping			Action
	Property	Type	Value	
Location based call is created even if DMS_Landbase service is down	Error.reason	String	N/A	coordinates based on provided search criteria. New call is created but it cannot be located in DMD. However, location information is specified within call comment.
	Error.details	String	N/A	
Created TroubleTickets – Trouble Ticket Is Successfully Created for Existing landbase data	Result	String	OK	External system sends CreatedTroubleTickets message with Poll.mRID or Street Intersection names. Adapter first searches landbase schema in order to obtain ladbase data. Once obtained, new trouble ticket is created and call can be located in DMD.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Created TroubleTickets – Unlocated Trouble Ticket Is Created for Non Existing Landbase Data	Result	String	OK	External system sends CreatedTroubleTickets message with ladbase data that do not exist. Adapter first searches landbase schema in order to obtain ladbase data. As landbase data do not exist new unlocated trouble ticket is created. Call cannot be located in DMD.
	Error.code	String	2.7	
	Error.level	String	INFORM	
	Error.reason	String	UnlocatableLandbaseTroubleTicket	
	Error.details	String	Could not locate call.	
Created TroubleTickets – Trouble Ticket Is Successfully Created for valid coordinates	Result	String	OK	External system sends CreatedTroubleTickets message with position points (coordinates) specified. New trouble ticket is created and call can be located in DMD. Note: Configurable coordinates conversion is available if X and Y coordinates are provided in coordinate system different than the one used. Coordinates are converted to appropriate projection.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Created TroubleTickets – Trouble ticket is forwarded to IMS, but callback about call creation is not received within predefined interval	Result	String	OK	External system sends CreatedTroubleTickets message. Adapter successfully processes message but does not receive response from IMS that call has been created within predefined time interval.
	Error.code	String	5.3	
	Error.level	String	WARNING	
	Error.reason	String	ImsCallbackNotReceived	

Use Case	Message Mapping			Action
	Property	Type	Value	
	Error.details	String	Call(s) creation has been forwarded to IMS, but callback is not received within {0} interval.	

5.2. ChangedTroubleTickets Operation

5.2.1. Overview

Once the trouble ticket is reported, sometimes there is a need to update trouble ticket information (caller contact data or comments). To provide these options, the *ChangedTroubleTickets* operation is introduced.

When the comment or caller contacts data (addition of a new caller contact data) for Trouble Ticket needs to be updated the external system creates the *ChangedTroubleTicketsEvent* object and invokes appropriate operation. The CRM 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 during the update of the Trouble Ticket. All changes introduced to the DMZ are asynchronously replicated to the CORE system.

The maximum length of comment field is configurable (by default, it is 500). Therefore, if the length of the comment with appended value from the request message exceeds defined maximum length, the CRM Adapter logs exception and returns the *TroubleTicketsResponse* with the FAILED result to calling system.

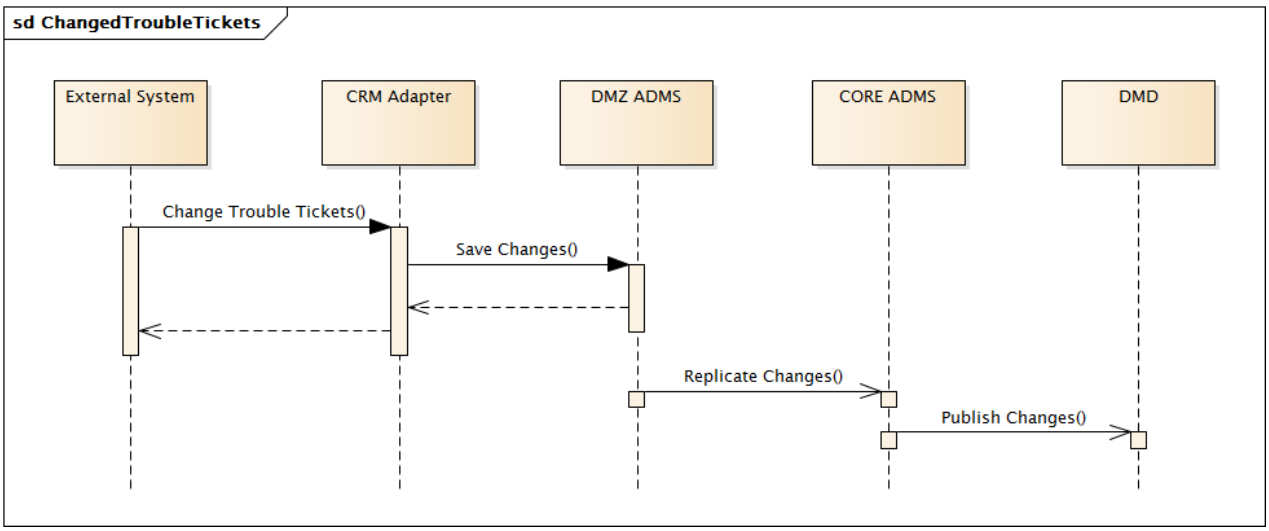

Figure 5.2 – The ChangedTroubleTickets operation execution

Depending on the both stages of validation, the CRM Adapter returns the appropriate *TroubleTicektsResponse* or *TroubleTicketsFault* with the detailed explanation of the occurred error. Figure 5.2 provides the visual representation for the described sequence of events.

5.2.2. Use Cases

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

Table 5.2 – The ChangedTroubleTickets operation use cases

Use Case	Message Mapping			Action
	Property	Type	Value	
Supported common use cases are described in Table 5.1 – The CreatedTroubleTickets operation use cases				
Changed TroubleTickets – Trouble Ticket comments are successfully updated	Result	String	OK	External system sends ChangedTroubleTickets message. Comment of all Trouble Tickets are updated. Response message is sent by CRM Adapter with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Changed TroubleTickets – Caller Contact data are successfully updated	Result	String	OK	External system sends ChangedTroubleTickets message with additional caller contact data specified. Caller contact data of existing Trouble Tickets are updated in a manner that additional data is added to already existing caller contact data without altering the existing data. First caller's first and last name will remain displayed in the Caller data tab. Same first and last name is used for all caller contact types (email, landline, mobile) specified in request message. Response message is sent by CRM Adapter with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Changed TroubleTickets – Data for update not provided	Result	String	PARTIAL/FAILED	External system sends ChangedTroubleTickets message that does not contain comment nor customer data. Trouble Tickets with valid data are processed, while for invalid ones, appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result.
	Error.code	String	1.2	
	Error.level	String	FATAL	
	Error.reason	String	UpdateDataMissing	
	Error.details	String	Comment and Customer data are not provided for trouble tickets(s): {0}.	
Changed TroubleTickets –	Result	String	PARTIAL/FAILED	

Use Case	Message Mapping			Action
	Property	Type	Value	
Duplicate TroubleTicket mRIDs	Error.code	String	2.7	External system sends ChangedTroubleTickets message that contains several duplicate mRIDs. Trouble Tickets with valid mRIDs are processed, while for invalid (duplicate) ones, appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result.
	Error.level	String	FATAL	
	Error.reason	String	DuplicateMRIDs	
	Error.details	String	Duplicate mRID {0} in the message.	
Changed TroubleTickets – Comments exceed limit	Result	String	PARTIAL/FAILED	External system sends ChangedTroubleTickets message where several Trouble Tickets have comment that exceeds limit. Trouble tickets from request that have valid data are processed, while for invalid ones appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result.
	Error.code	String	2.7	
	Error.level	String	WARNING	
	Error.reason	String	CommentExceedsLimit	
	Error.details	String	Comment exceeds limit for trouble ticket(s): {0}	
Changed TroubleTickets – Missing TroubleTickets mRIDs	Result	String	PARTIAL/FAILED	External system sends ChangedTroubleTickets message where Trouble Tickets do not contain mRID. Trouble tickets from request that have valid data are processed, while for invalid ones appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result.
	Error.code	String	1.2	
	Error.level	String	FATAL	
	Error.reason	String	MrIDMissing	
	Error.details	String	MrID is not specified for trouble ticket(s).	
Changed TroubleTickets – Invalid TroubleTickets mRIDs or names (ExternalSystemIDs)	Result	String	PARTIAL/FAILED	External system sends ChangedTroubleTickets message where several Trouble Tickets contain invalid mRID or name. Trouble tickets from request that have valid data are processed, while for invalid ones appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	EntityNotFound	
	Error.details	String	Trouble ticket {0} not found in ADMS.	
Changed TroubleTickets – Both TroubleTicket mRID and name are specified	Result	String	OK	External system sends ChangedTroubleTickets message where several Trouble Tickets contain valid mRID and name (external system ID). mRID attribute is used as trouble ticket unique identifier and valid trouble tickets are processed,
	Error.code	String	N/A	
	Error.level	String	N/A	

Use Case	Message Mapping			Action
	Property	Type	Value	
	Error.reason	String	N/A	while for invalid ones appropriate error is returned. Response message is sent by CRM Adapter with OK result.
	Error.details	String	N/A	
Changed TroubleTickets – Missing CsrID	Result	String	FAILED	External system sends ChangedTroubleTickets message where CsrID is not specified/missing. Response message is sent by CRM Adapter with PARTIAL/FAILED result and message is discarded.
	Error.code	String	1.8	
	Error.level	String	FATAL	
	Error.reason	String	CsrIDMissing	
	Error.details	String	CsrID is not provided.	

6. GETTROUBLETICKETS SERVICE

6.1. GetTroubleTickets Operation

6.1.1. Overview

External systems sometimes have a need to pull trouble ticket information stored in the EcoStruxure GridOps for various reporting purposes. In order to provide interface for requesting both active and archived trouble ticket information, the *GetTroubleTicketsService* is available as part of the CRM Interface.

The *GetTroubleTickets* operation provides two options for pulling active and archived trouble tickets information:

- Pull trouble ticket data related to one incident (by incident mRID).
- Pull trouble ticket data per trouble ticket unique identifier (trouble ticket mRID).
- Pull trouble ticket data per external system unique identifier (trouble ticket name).
- Pull trouble ticket data per SDP unique identifier (usage point mRID).

When the trouble ticket data needs to be pulled from the EcoStruxure GridOps, external system creates the *GetTroubleTicketsRequest* object and invokes the appropriate operation. The CRM performs initial validation of the received data, transforms it into the appropriate internal format and pulls the data from the DMZ system.

The *GetTroubleTicketsRequest* object must have the *Header.Context* attribute populated with the information which trouble ticket data is requested from the EcoStruxure GridOps: active, archived or all. Besides the *Header.Context* attribute, only one of the following search criteria can be specified:

- incident unique identifier – CRM Adapter populates the response with the information related to all trouble tickets related to specified incident.
- trouble ticket unique identifier – CRM Adapter populates the response with the information related to the individual trouble ticket.
- trouble ticket external system unique identifier – CRM Adapter populates the response with the information related to the individual trouble ticket.
- SDP unique identifier – CRM Adapter populates the response with the information related to all trouble tickets related to specified service delivery point.

If the request message does not contain any of these values populated or several values are populated, from the CRM Adapter perspective request message is invalid.

Depending on the several stages of validation, the CRM Adapter returns the appropriate *GetTroubleTicketsResponse* or *GetTroubleTicketsFault* with the detailed explanation of the occurred error.

The visual representation for the described sequence of events are provided in Figure 6.1 and Figure 6.2.

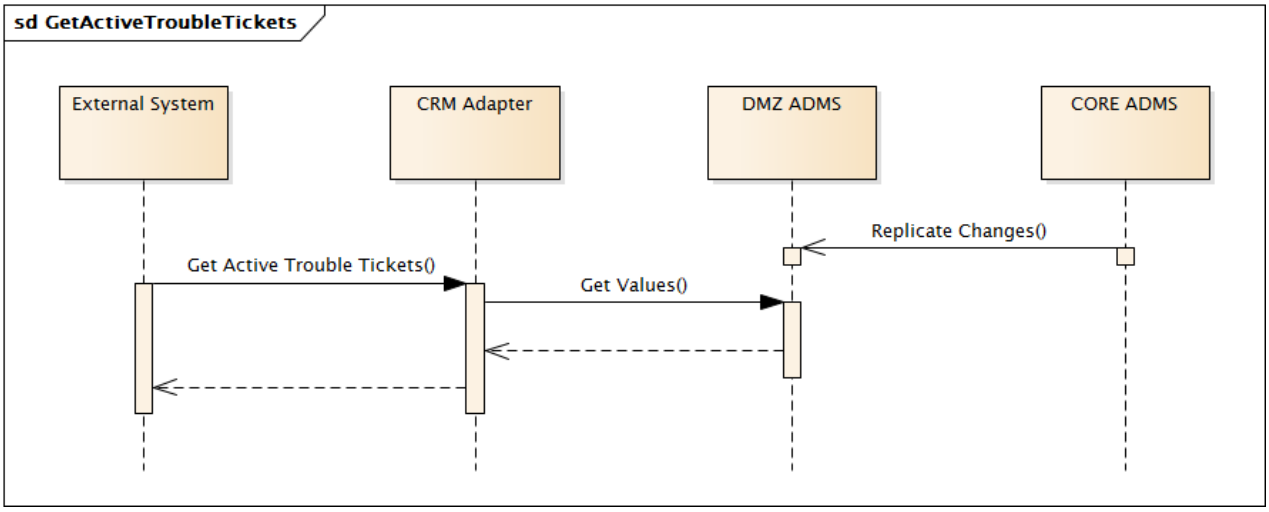

Figure 6.1 – The GetTroubleTickets (active) operation execution

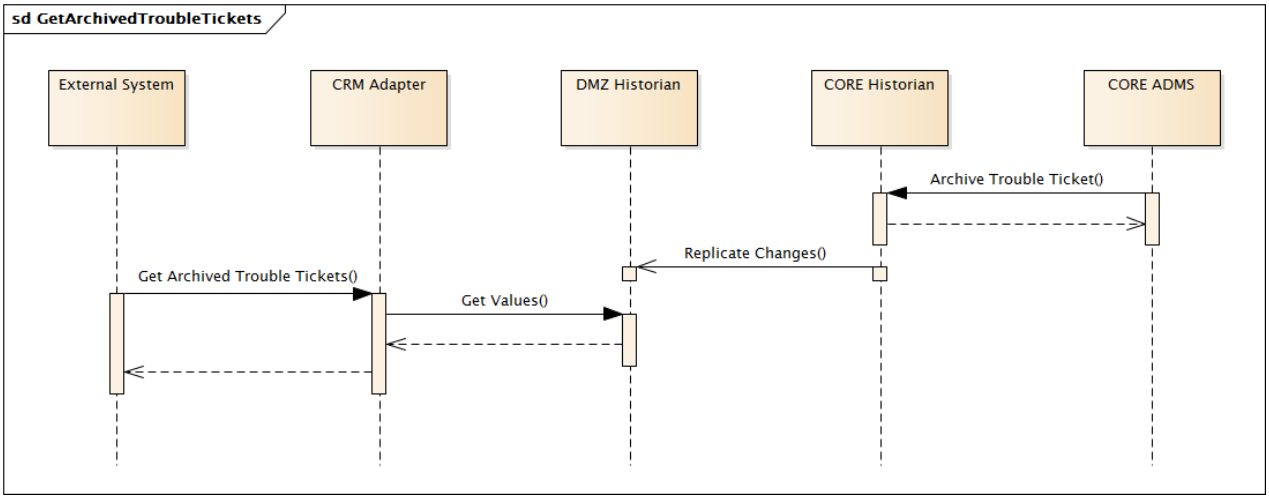

Figure 6.2 – The GetTroubleTickets (archived) operation execution

6.1.2. Use Cases

The list of possible use cases and corresponding faults is given in Table 6.1.

Table 6.1 – The GetTroubleTickets operation use cases

Use Case	Message Mapping			Action
	Property	Type	Value	
Supported common use cases are described in Table 5.1 – The CreatedTroubleTickets operation use cases				
Get TroubleTickets – Message contains valid Trouble Tickets mRID	Result	String	OK	External system sends GetTroubleTickets request message with valid TroubleTicket.mRID. Response message is sent by CRM Adapter with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Get Trouble Tickets – Message contains valid Trouble Tickets name	Result	String	OK	External system sends GetTroubleTickets request message with valid Trouble Tickets name (external system ID). Response message is sent by CRM Adapter with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Get Trouble Tickets – Message contains valid Incident mRID	Result	String	OK	External system sends GetTroubleTickets request message with valid Incident.mRID. Response message is sent by CRM Adapter with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Get Trouble Tickets –	Result	String	OK	
	Error.code	String	N/A	

Use Case	Message Mapping			Action
	Property	Type	Value	
Message contains valid Usage Point mRID	Error.level	String	N/A	External system sends GetTroubleTickets request message with Usage Point mRID for which there are reported trouble tickets. Response message is sent by CRM Adapter with OK result.
	Error.reason	String	N/A	
	Error.details	String	N/A	
Get Trouble Tickets – Context Not Provided	Result	String	FAILED	External system sends GetTroubleTickets request message without context field specified. Response message is sent by CRM Adapter with FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	ContextMissing	
	Error.details	String	Context element not found in message.	
Get Trouble Tickets – Message contains invalid Trouble Tickets mRID	Result	String	FAILED	External system sends GetTroubleTickets request message with trouble ticket mRID that does not exist. Response message is sent by CRM Adapter with FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	EntityNotFound	
	Error.details	String	Invalid entity mRID(s): {0}	
Get Trouble Tickets – Message contains invalid Trouble Tickets name	Result	String	FAILED	External system sends GetTroubleTickets request message with trouble ticket name (external system ID) that does not exist. Response message is sent by CRM Adapter with FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	EntityNotFound	
	Error.details	String	Invalid Trouble Ticket name(s): {0}	
Get Trouble Tickets – No trouble tickets for provided Usage Point	Result	String	OK	External system sends GetTroubleTickets request message with usage point mRID for which there are no reported trouble tickets. Response message is sent by CRM Adapter with OK result.
	Error.code	String	2.7	
	Error.level	String	INFORM	
	Error.reason	String	EntityNotFound	

Use Case	Message Mapping			Action
	Property	Type	Value	
	Error.details	String	No trouble tickets found for provided search criteria: {0}	
Get Trouble Tickets – Message contains invalid Incident mRID	Result	String	FAILED	External system sends GetTroubleTickets request message with incident mRID that does not exist in system. Response message is sent by CRM Adapter with FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	EntityNotFound	
	Error.details	String	Invalid entity mRID(s): {0}	
Get Trouble Tickets – Message does not contain search criteria	Result	String	FAILED	External system sends GetTroubleTickets request message without TroubleTicket.mRID and Incident.mRID specified. Response message is sent by CRM Adapter with FAILED result.
	Error.code	String	1.2	
	Error.level	String	FATAL	
	Error.reason	String	SearchCriteriaMissing	
	Error.details	String	Search criteria is not provided in request message.	
Get Trouble Tickets – Message contains multiple search criteria	Result	String	FAILED	External system sends GetTroubleTickets request message with several search criteria specified (TroubleTicket.mRID, TroubleTicket.name, Incident.mRID or UsagePoint.mRID). Response message is sent by CRM Adapter with FAILED result.
	Error.code	String	1.2	
	Error.level	String	FATAL	
	Error.reason	String	MultipleSearchCriteriaProvided	
	Error.details	String	Multiple search criteria provided in request message.	
Get Trouble Tickets – Incident does not contain trouble tickets	Result	String	OK	External system sends GetTroubleTickets request message with valid incident mRID, but given incident does not contain any trouble tickets. Response message is sent by CRM Adapter with OK result and empty payload.
	Error.code	String	2.7	
	Error.level	String	INFORM	
	Error.reason	String	EntityNotFound	
	Error.details	String	No trouble tickets found for provided search criteria: {0}	
Get TroubleTickets –	Result	String	OK	
	Error.code	String	N/A	

Use Case	Message Mapping			Action
	Property	Type	Value	
Pull both active and archived trouble tickets, regardless of search criteria	Error.level	String	N/A	External system sends GetTroubleTickets request message with one of the valid search criteria (TroubleTicket.mRID, TroubleTicket.name, Incident.mRID or UsagePoint.mRID). Response message is sent by CRM Adapter with OK result.
	Error.reason	String	N/A	
	Result	String	N/A	
Get Trouble Tickets – Trouble ticket contains multiple caller contacts	Result	String	OK	External system sends GetTroubleTickets request message with one of the valid search criteria. One of the TroubleTickets has multiple caller contacts. Customer data is populated with first caller contact defined (or preferred caller contact if it is specified). Response message is sent by CRM Adapter with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Result	String	N/A	
Invalid Context	Result	String	FAILED	External system sends GetTroubleTickets request message with invalid Context. Response message is sent by CRM Adapter with FAILED result and message is discarded.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	InvalidContext	
	Error.details	String	Invalid context: {0}.	

7. GETCALLBACKS SERVICE

7.1. GetCallbacks Operation

7.1.1. Overview

After the incident is restored, the typical scenario involves notification to the affected customers that the power has been restored, if those customers have requested the callback during trouble ticket reporting. When the CSR agent needs to pull the next callback from the callback queue, the CTA creates the *GetCallBacksRequest* object and invokes the *GetCallbacks* operation.

The CRM Adapter performs initial validation of the received data, transforms it into the appropriate internal format and pulls the appropriate number of callbacks from the callback queue in the DMZ system. Based on the obtained data, Adapter creates the *GetCallBacksResponse* object and returns it to the calling system. In case when there are no callbacks in the queue, the empty response is returned.

If by any chance request message is not valid according to the predefined XSD schema, Adapter returns the *GetCallBacksFault* with the detailed explanation of the occurred error.

Figure 7.1 provides the visual representation for the described sequence of events.

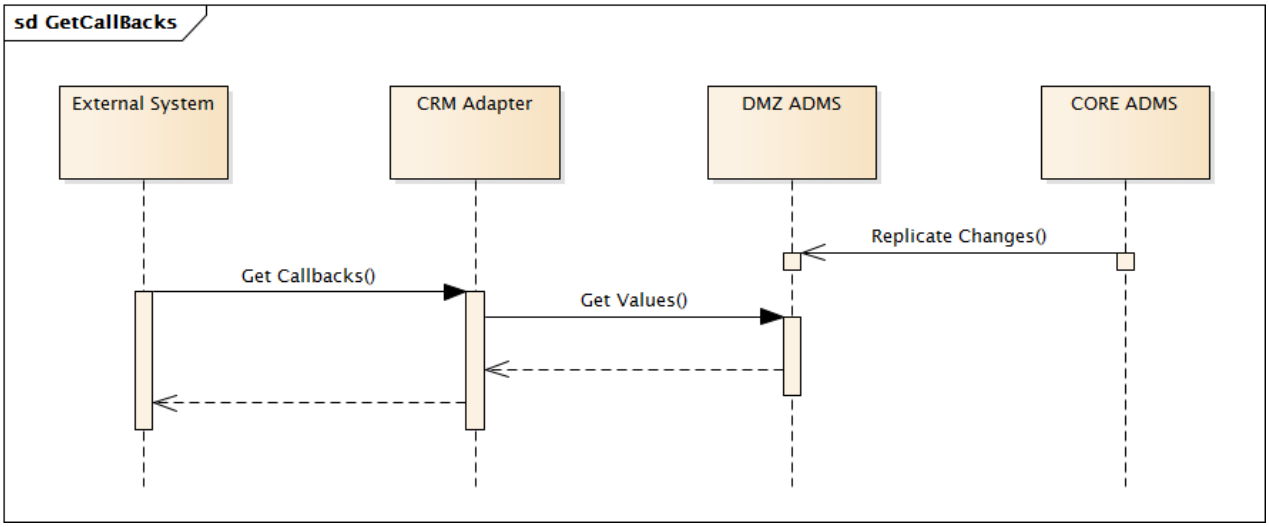

Figure 7.1 – The GetICallbacks operation execution

7.1.2. Use Cases

The list of possible use cases and corresponding faults is given in Table 7.1.

Table 7.1 – The GetCallBacks operation use cases

Use Case	Message Mapping			Action
	Property	Type	Value	
Supported common use cases are described in Table 5.1 – The CreatedTroubleTickets operation use cases				
Get CallBacks – Message contains populated count, csrId, valid languageId and priority	Result	String	OK	External system sends GetCallBack request message with count and csrId populated and valid languageId and priority. Response message is sent by CRM Adapter with OK result. Requested number of unassigned callbacks according to priority and languageId is sent to the caller. Note: If in request message attribute count is equal to zero, and priority and languageId are valid, adapter will send first callback according to priority and languageId to the caller. Same behavior is when count attribute is not sent in request message.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Get CallBacks – Callback has multiple caller contacts	Result	String	OK	External system sends GetCallBack request message with count and csrId populated and valid languageId and priority. One of the callbacks has multiple caller contacts. Customer data is populated with caller which has preferred caller contact defined. In rare cases when preferred caller contact is not defined, first caller is returned. Response message is sent by CRM Adapter with OK result. Requested number of unassigned callbacks according to priority and languageId is sent to the caller.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Get CallBacks – Message does not contain csrId	Result	String	FAILED	External system sends GetCallBack request message without csrId populated. Response message is sent by CRM Adapter with FAILED result.
	Error.code	String	1.2	
	Error.level	String	FATAL	
	Error.reason	String	CsrIdMissing	
	Error.details	String	Customer Service Representative ID is not provided in request message.	
Get CallBacks –	Result	String	FAILED	

Use Case	Message Mapping			Action
	Property	Type	Value	
Priority is Not a Number	Error.code	String	1.2	External system sends GetCallBack request message where priority is not a number. Response message is sent by CRM Adapter with FAILED result.
	Error.level	String	FATAL	
	Error.reason	String	PriorityNotNumber	
	Error.details	String	Priority {0} is invalid numerical value.	
Get CallBacks – No callbacks found for provided search criteria	Result	String	OK	External system sends GetCallBack request message with parameters for which there are no callbacks. Response message is sent by CRM Adapter with OK result.
	Error.code	String	1.2	
	Error.level	String	INFORM	
	Error.reason	String	EntityNotFound	
	Error.details	String	No callbacks found for provided search criteria.	
Get CallBacks – Message contains invalid languageId	Result	String	FAILED	External system sends GetCallBack request message with languageId that does not exists in system. Response message is sent by CRM Adapter with FAILED result.
	Error.code	String	1.2	
	Error.level	String	FATAL	
	Error.reason	String	InvalidLanguageId	
	Error.details	String	Received language id isn't valid or isn't in configuration.	

8. RECEIVECALLBACKSRESULTS SERVICE

8.1. CreatedCallBacksResults Operation

8.1.1. Overview

After the callback is pulled and performed by the CSR, regardless of the callback result (restored, not restored, no answer, etc.), the CSR needs to update the callback status. Update of the callback status is possible through the *CreatedCallBacksResults* operation of the *ReceiveCallBacksResultsService*.

The external system forms the *CreatedCallBacksResultsEvent* object with the same callback mRID as the one previously pulled and sends it to the CRM Adapter. When request is received, the CRM 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 on the IMS during the update of the callback result. All changes introduced to the IMS in DMZ are asynchronously replicated to the IMS in CORE system.

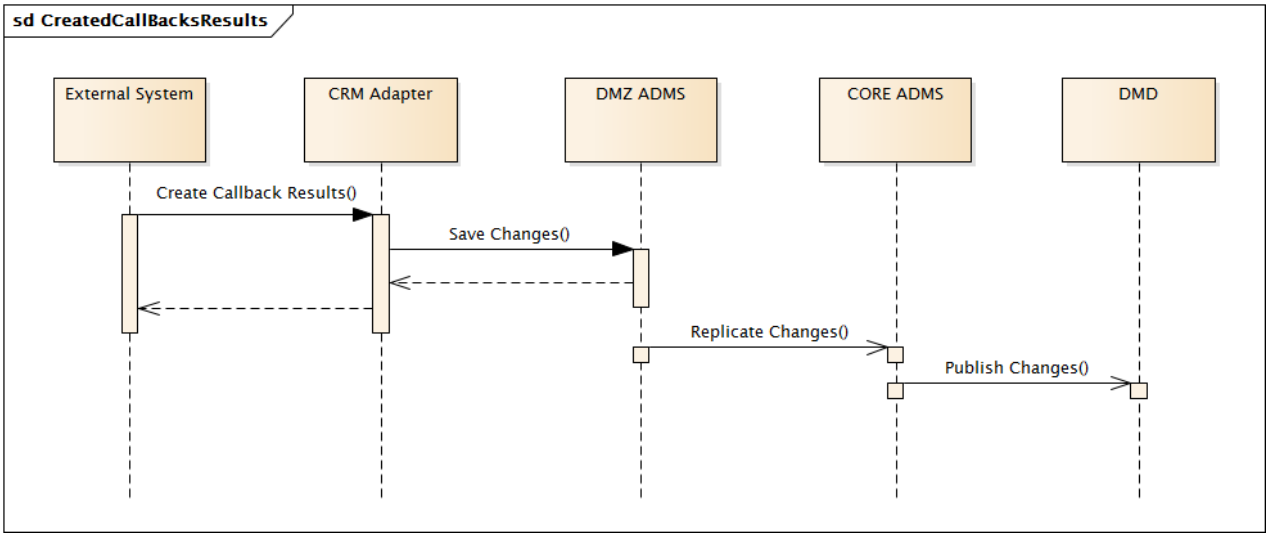

Figure 8.1 – The CreatedCalllBacksResults operation execution

Depending on the both stages of validation, the CRM Adapter returns the appropriate *CreatedCallBacksResultsResponse* or *CreatedCallBacksResultsFault* with the detailed explanation of the occurred error. Figure 8.1 provides the visual representation for the described sequence of events.

8.1.2. Use Cases

The list of possible use cases and corresponding faults is given in Table 8.1.

Table 8.1 – The CreatedCallBacksResults operation use cases

Use Case	Message Mapping			Action
	Property	Type	Value	
Supported common use cases are described in Table 5.1 – The CreatedTroubleTickets operation use cases				
Created CallBacksResults – CallBacks statuses updated successfully	Result	String	OK	External system sends CreatedCallBacksResults message for existing callback ID, with valid callback status and csrId that previously assigned the callback. Response message is sent by CRM Adapter with OK result. Status of callback with given ID is updated successfully. Comment is appended to existing comment.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Created CallBacksResults – Invalid CallBacks mRIDs	Result	String	PARTIAL/FAILED	External system sends CreatedCallBacksResults message where some of the callbacks mRIDs do not exist in system. Statuses of callbacks with existing mRIDs are updated successfully, while for invalid ones appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	EntityNotFound	
	Error.details	String	Invalid callback(s) mRID(s): {0}	
Created CallBacksResults – Invalid CallBackResults	Result	String	FAILED	External system sends CreatedCallBacksResults message with invalid callback results (status.value). Statuses of callbacks with valid callback result are updated successfully, while for invalid ones appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	InvalidCallBackResult	
	Error.details	String	Invalid callback result: {0} for callback(s): {1}	
Created CallBacksResults – Comment exceeds limit	Result	String	OK	External system sends CreatedCallBacksResults message with callback results where some of the comments exceed configurable limit (default 500 characters) after
	Error.code	String	2.7	

Use Case	Message Mapping			Action
	Property	Type	Value	
	Error.level	String	WARNING	appending. Statuses of callbacks are updated successfully, but comment is not appended to existing comment. Response message is sent by CRM Adapter with OK result.
	Error.reason	String	CommentExceedsLimit	
	Error.details	String	Comment exceeds limit for callback(s): {0}	
Created CallBacksResults – Different csrId	Result	String	FAILED	External system sends CreatedCallBacksResults message where some of the callback results have csrId which is different from csrId that assigned the callback previously. Statuses of callbacks for matching csrIds are updated successfully, while for unmatched ones appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result. Note: CsrId received in request message from external system won't be validated, when appropriate callback is assigned to CrmAdapter. If all other data in received message are valid, callback result will be updated successfully.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	DifferentCsrId	
	Error.details	String	Callback result cannot be updated if: {0} or adapter is not assigned to that callback.	
Created CallBacksResults – Callback Result Missing	Result	String	FAILED	External system sends CreatedCallBacksResults message where some of the callback do not have result field specified. Statuses of callbacks with result field are updated, while for the ones that do not have result field specified, appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	CallbackResultMissing	
	Error.details	String	Callback result element not found in message for callback(s): {0}.	
Changed CallBacksResults – Duplicate mRIDs	Result	String	PARTIAL/FAILED	External system sends CreatedCallBacksResults message that contains several duplicate mRIDs. CallBacksResults with valid mRIDs are processed, while for invalid (duplicate) ones, appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result.
	Error.code	String	2.7	
	Error.level	String	FATAL	
	Error.reason	String	DuplicateMRIDs	
	Error.details	String	Duplicate mRID {0} in the message.	
Changed CallBacksResults –	Result	String	PARTIAL/FAILED	

Use Case	Message Mapping			Action
	Property	Type	Value	
Missing mRIDs	Error.code	String	2.7	External system sends CreatedCallBacksResults message where several CallBacksResults do not have mRIDs specified. CallBacksResults with valid mRIDs are processed, while for invalid ones, appropriate error is returned. Response message is sent by CRM Adapter with PARTIAL/FAILED result.
	Error.level	String	FATAL	
	Error.reason	String	MissingMRIDs	
	Error.details	String	Callback mrid is not provided.	

9. SENDCALLBACKS SERVICE

9.1. CreatedCallBacks Operations

9.1.1. Overview

Depending on the utility' business process there can be a need to send callbacks in various occasions (ETR update, outage resolution, etc.) to the IVR system so it can resolve them automatically. The CRM Adapter delivers mentioned functionality using publish/subscribe integration pattern. Created callbacks are stored in the callback queue. The CRM Adapter checks on a configurable basis for new callbacks based on the customer priority (configurable) or an indication that certain callbacks should be resolved automatically by the IVR. If there are new callbacks in the queue, the CRM Adapter creates message with the callbacks information and invokes the *CreatedCallBacks* operation of the *SendCallBacksService*, hosted on the external system side.

Figure 9.1 provides the visual representation for the described sequence of events for aforementioned operation.

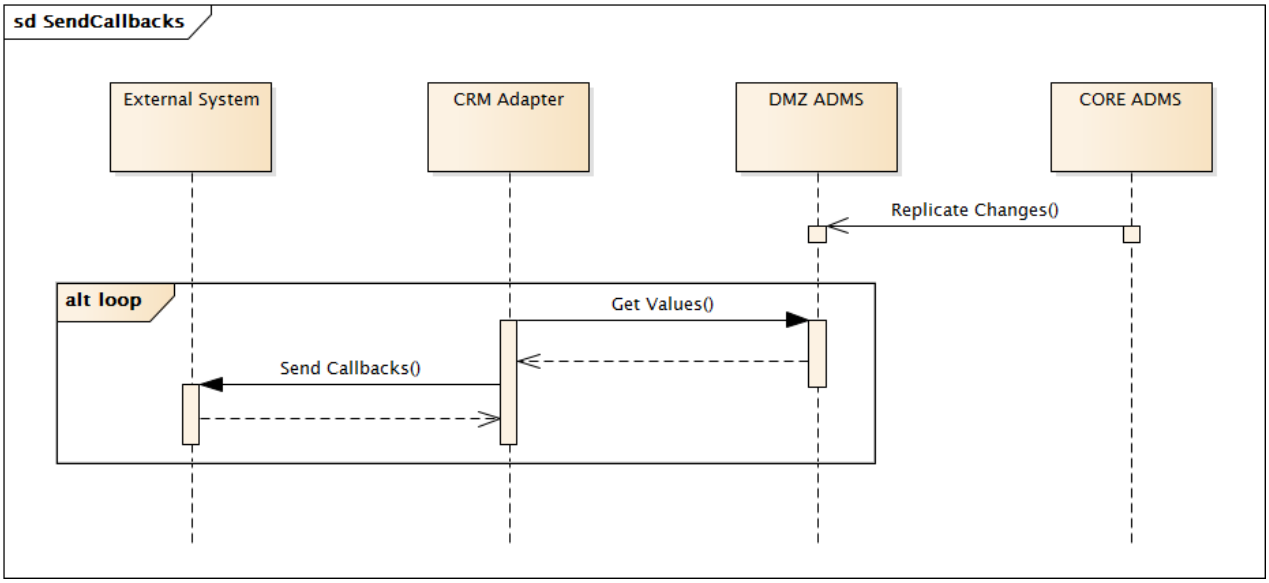

Figure 9.1 – The CreatedCallBacks operation execution

In order to invoke the *CreatedCallBacks* operation, the CRM Adapter forms *CreatedCallBacksEvent* object. Once the message is processed and the operation is finished on the IVR side (by *SendCallBackService)*, the appropriate response is returned in form of the *CallBacksResponse* message. If some error occurs, the *CallBacksFault* message is returned.

9.1.2. Use Cases

The list of possible use cases and corresponding faults is given in Table 9.1.

Table 9.1 – The CreatedCallBacks operation use cases

Use Case	Message Mapping			Action
	Property	Type	Value	
Created CallBacks – CallBacks are sent successfully	Result	String	OK	CRM Adapter periodically pulls unassigned callbacks of appropriate (configurable) customer priority or the ones that are marked for automatic resolution. CRM adapter sends a CreatedCallBacks message to external system. Valid response message is sent by external system with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Created CallBacks – CallBacks contain multiple caller contacts	Result	String	OK	CRM Adapter periodically pulls unassigned callbacks of appropriate (configurable) customer priority or the ones that are marked for automatic resolution. One of the callbacks has multiple caller contacts. Customer data is populated with caller which has preferred caller contact defined. In rare cases when preferred caller contact is not defined, first caller is populated. CRM adapter sends a CreatedCallBacks message to external system. Valid response message is sent by external system with OK result.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Created CallBacks – Unavailable external system	Result	String	FAILED	CRM Adapter pulls callbacks of appropriate (configurable) priority and tries to send CreatedCallBacks message to external system configurable number of times. After it fails, CallBacks will remain assigned preconfigured time period until EcoStruxure GridOps dissociates them.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Created CallBacks – Invalid response message	Result	String	FAILED	CRM Adapter pulls callbacks of appropriate (configurable) priority and tries to send CreatedCallBacks message to external system. If invalid response message is received from external system, CRM Adapter writes error in log file.
	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 xsd schema. Reason: {0}.	

10. MESSAGES

10.1. Common

10.1.1. Header

The header section is defined according to the IEC 61968-100. Currently, there are two required fields that must be populated:

- ***Verb*** – to identify a specific action to be taken. There is an enumerated set of valid verbs, where commonly used values include get", "create", "change", "cancel", "close", "execute" and "reply". Within event notification messages "past tense" verbs are used, which can include "created", "changed", "canceled", "closed" and "executed". Implementations should treat deprecated verbs "update" and "updated" as synonyms to "change" and "changed".
- ***Noun*** – to identify the subject of the action and/or the type of the payload, such as TroubleTickets, CallBacks, CallBackResults, etc.

Field that can be optionally supplied include the following:

- ***Revision*** – to indicate the revision of the message definition. By default, this needs to be "1".
- ReplayDetection – this is a complex element with a timestamp and a nonce used to guard against replay attacks. The timestamp is generated by the source system to indicate when the message was created. The nonce is a sequence number or randomly generated string (e.g., UUID) that would not be repeated by the source system for at least a day. This serves to improve encryption.
- Context – a string that can be used to identify the context of the message. This can help provide an application level guard against incorrect message consumption in configurations where there may be multiple system environments running over the same messaging infrastructure. Some example values are the PRODUCTION, TESTING, STUDY and TRAINING.
- ***Timestamp*** – an ISO 8601 compliant string that identifies the time the message was sent. This is analogous to the JMSTimestamp provided by JMS. Either Zulu ('Z') time or time with a time zone offset may be used.
- ***Source*** – identifying the source of the message, which should be the name of the system or organization.
- AsyncReplyFlag – the Boolean data type ("true" or "false" values) that indicates whether a reply message will be sent asynchronously. By default, replies are assumed to be sent synchronously.
- ReplyAddress – the address to which replies should be sent. This is typically used for asynchronous replies. This should take the form of a URL, topic name or queue name. This is analogous to the JMSReplyTo field provided by JMS. This is ignored when using unidirectional integration patterns (e.g., AckRequired=false). If the reply address is a topic, the topic name should be prefixed by "topic". If the reply address is a queue, the queue name should be prefixed by "queue". If the reply address is a web service, the reply address should be a URL beginning with "http://" or "https://".
- AckRequired – the Boolean data type ("true" or "false" values) that indicates whether an acknowledgement is required. If it is false, this would indicate that a unidirectional integration pattern is being used for communicating transactional messages.

- User – a complex structure that identifies the user and associated organization. Should be supplied as it may be required for some interfaces, depending upon underlying implementations. This allows the UsersID string and optional the Organization string as sub-elements.
- ***MessageID*** – a string that uniquely identifies a message. Use of the UUID or sequence number is recommended. This is analogous to the JMSMessageID provided by JMS. A process should not issue two messages using the same MessageID value.
- ***CorrelationID*** – this is used to "link" messages together. This can be supplied on a request, so that the client can correlate a corresponding reply message. The server will place the incoming CorrelationID value as the CorrelationID on the outgoing reply. If not supplied on the request, the CorrelationID of the reply should be set to the value of the MessageID that was used on the request, if present. This is analogous to the use of the JMSCorrelationID provided by JMS. Given that the CorrelationID is used to 'link' messages together, it may be reused on more than one message. Use of a UUID or sequence number is recommended.
- Comment – any descriptive text, but shall never be used for any processing logic.
- Property – a complex type that allows custom name/value pairs to be conveyed. The source and targets would need to agree upon usage. These are analogous to the Property as defined by JMS.
- Any – it can be used for custom extensions.

Figure 10.1 shows the graphical representation of the header section.

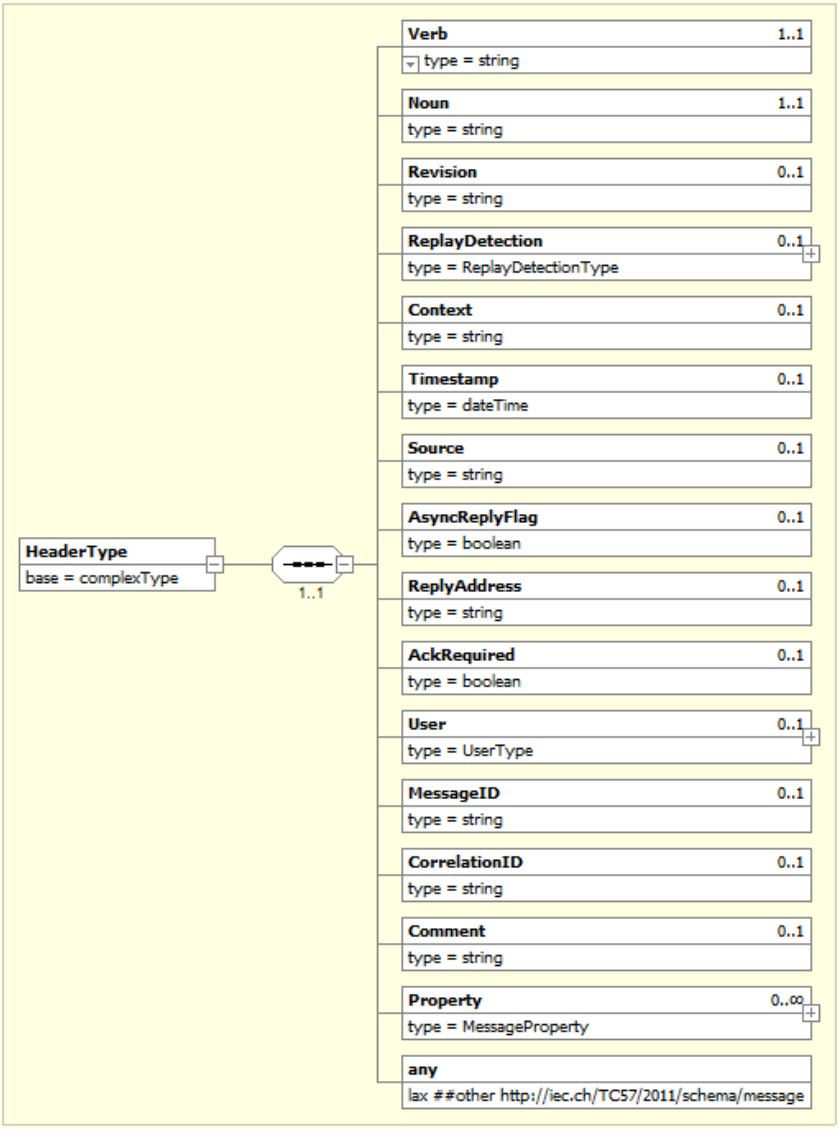

Figure 10.1 – The header section

10.1.2. Reply and Fault

The Reply.result value is an enumeration and would be populated in the following manner:

- "OK" – if there are no errors and all results have been returned. There is no requirement that the Reply.Error element be present.
- "PARTIAL" – if only a partial set of results has been returned, with or without errors. Existence of errors is indicated with one or more the Reply.Error.code elements.
- “FAILED" – if no result can be returned due to one or more errors, indicated with one or more the Reply.Error elements, each with a mandatory application level “code”.

If the result type is “PARTIAL” or “FAILED”, the **Error** field will be populated with the appropriate error description. The contents of the **Reply** and **Error** fields are presented in Figure 10.2.

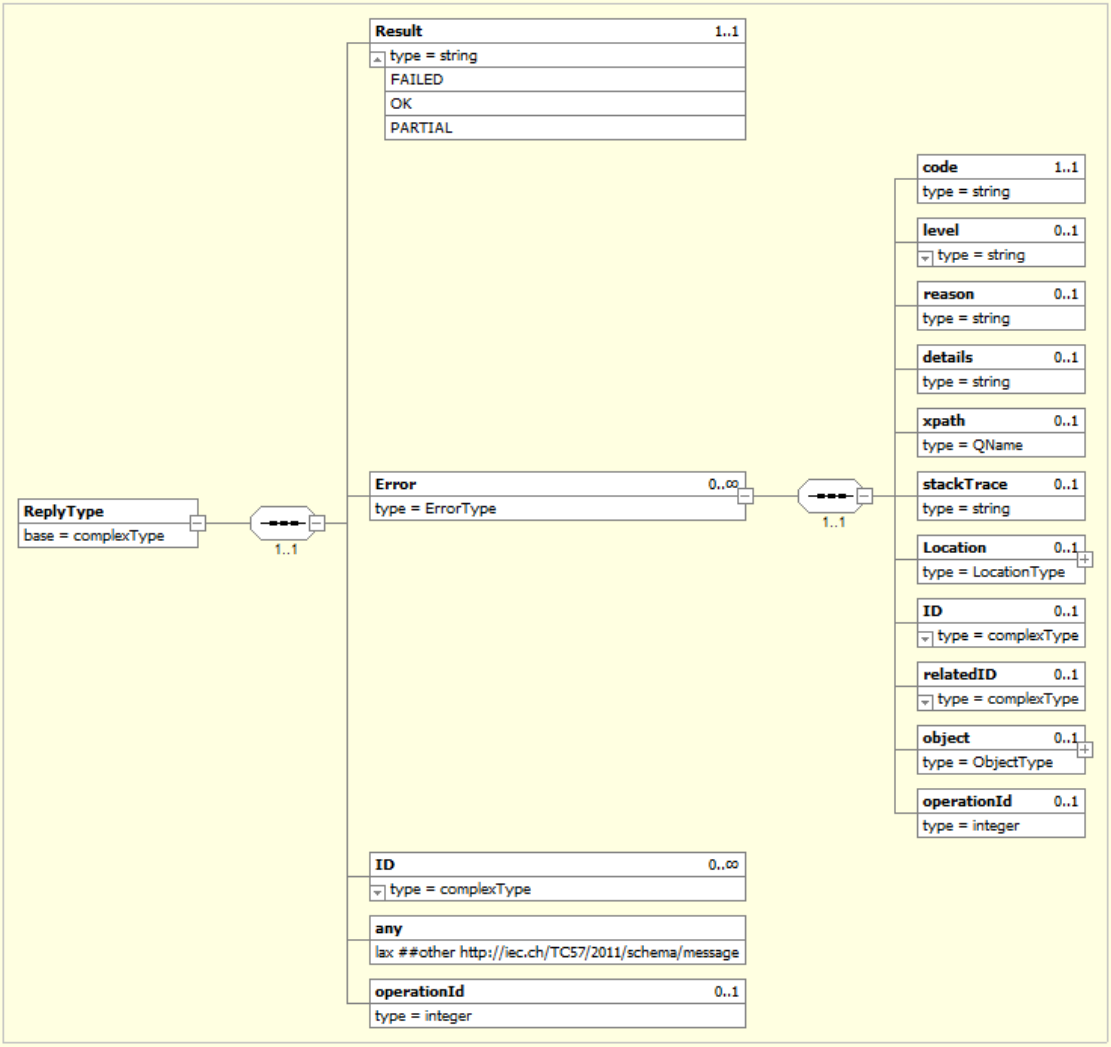

*Figure 10.2 – The **Reply** and **Error** field contents*

10.2. CreatedTroubleTickets Operation Messages

The operation definition:

CreatedTroubleTicketsResponse CreatedTroubleTickets(*CreatedTroubleTicketsEvent*)

10.2.1. Request

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

- Header
- Payload

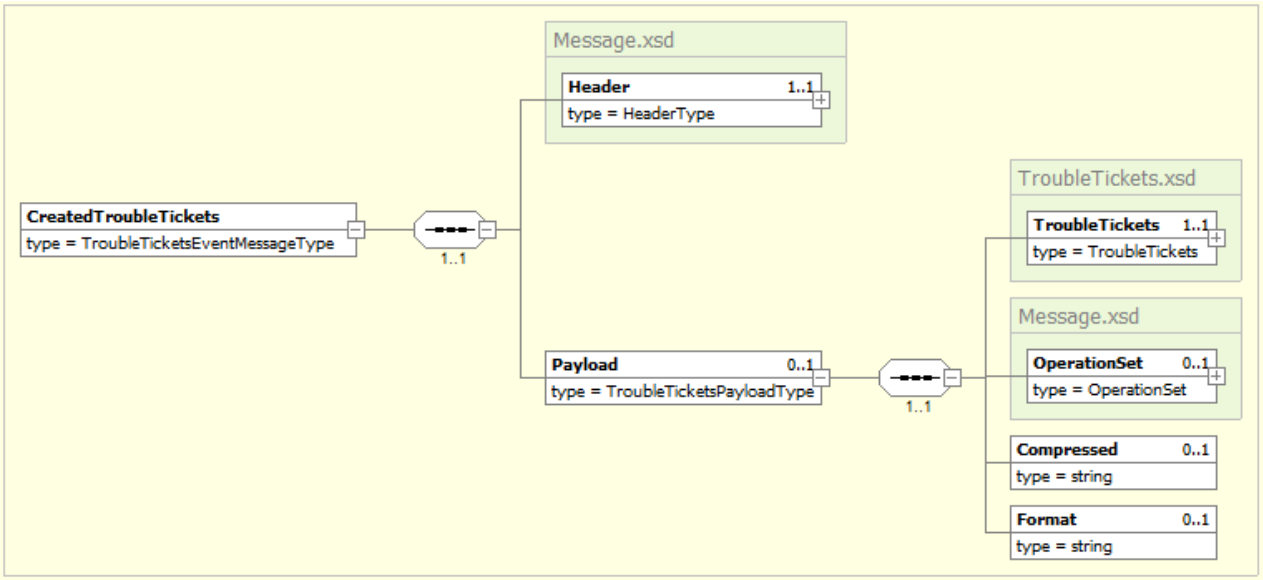

Figure 10.3 – The CreatedTroubleTicketsEvent message

The Payload sections carries the CIM defined profile (*TroubleTickets.xsd*) for insertion of one or several trouble tickets. The visual representation of the *TroubleTickets.xsd* schema is given in Figure 10.4.

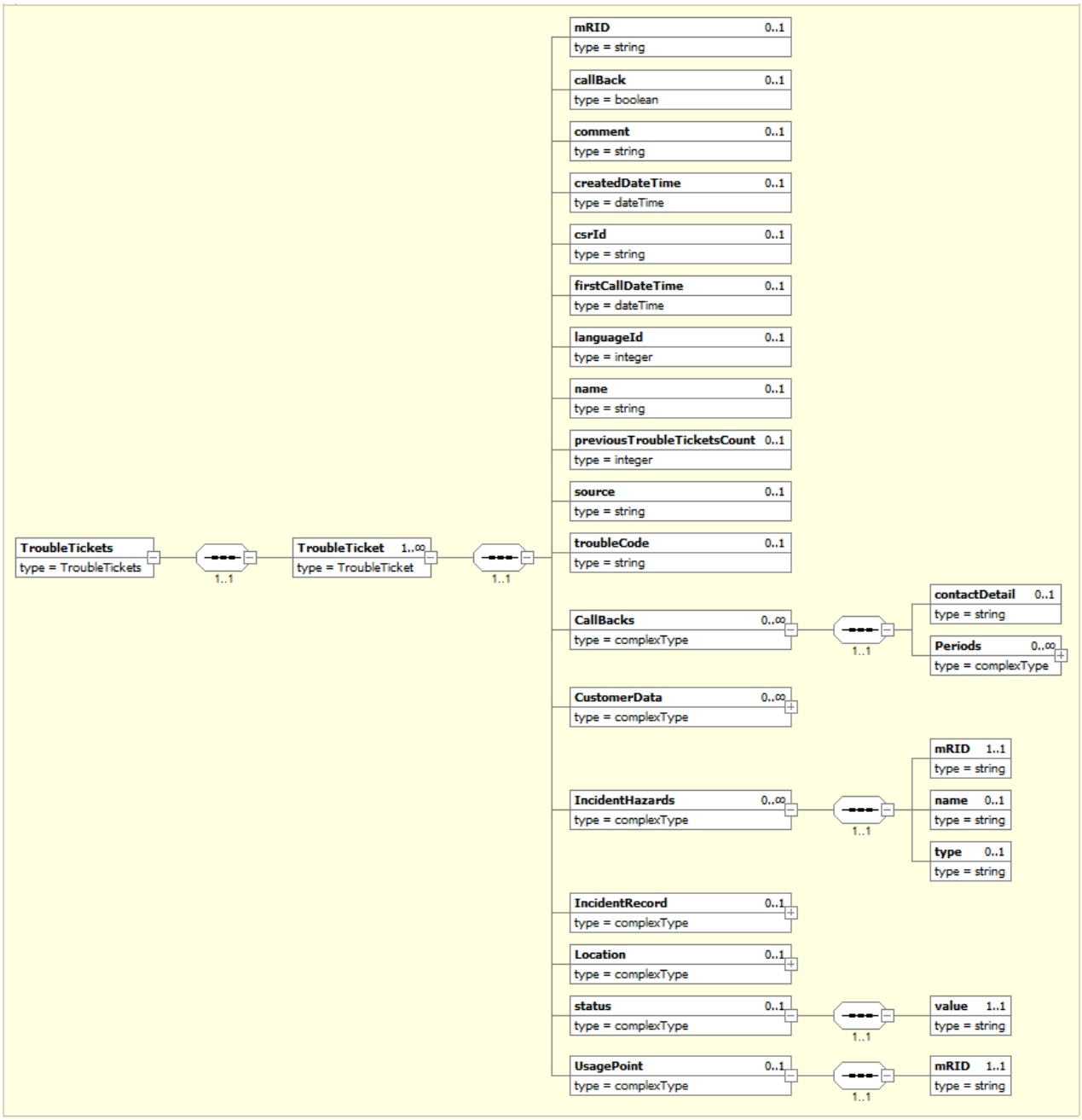

Figure 10.4 – TroubleTickets.xsd

Since *TroubleTickets.xsd* schema contains information about the caller contact and the location of the trouble call, Figure 10.5 and Figure 10.6 show data about those two objects.

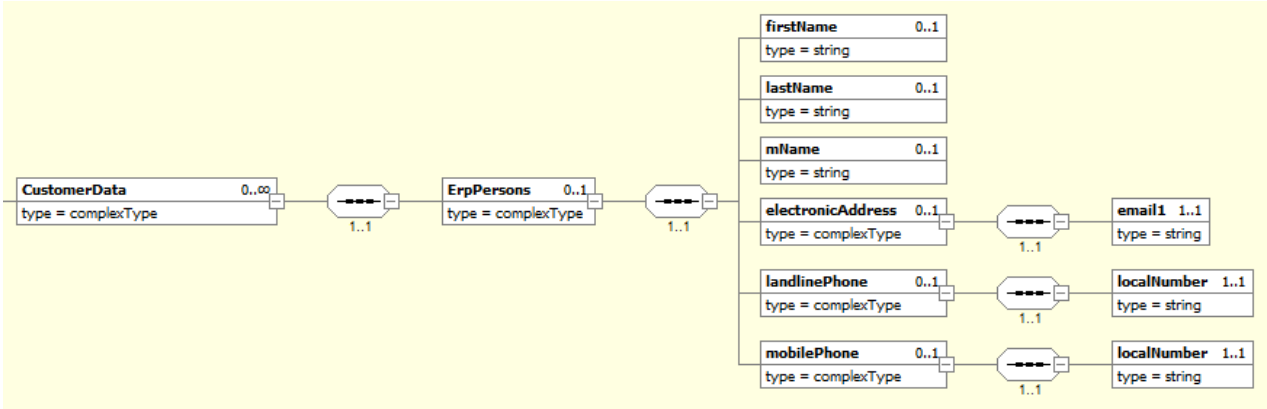

Figure 10.5 – The CustomerData object

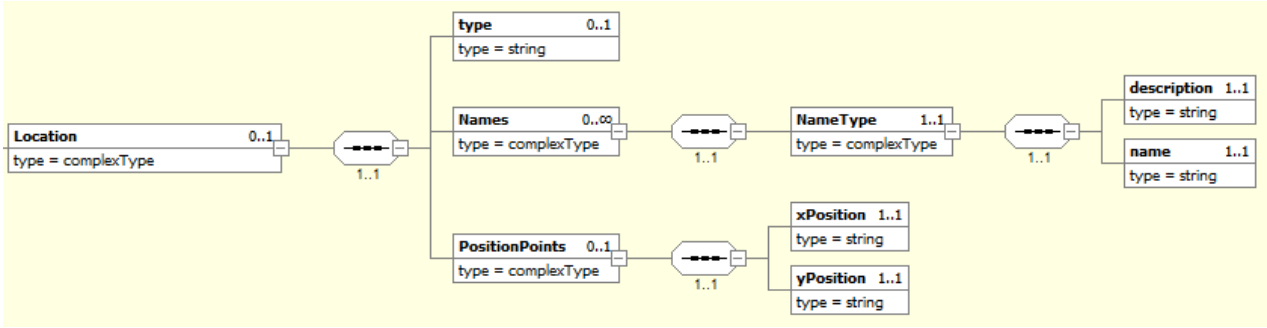

Figure 10.6 – The Location object

Table 10.1 defines the mapping between the *TroubleTickets.xsd* and the appropriate entities in the outage model.

Table 10.1 – The CreatedTroubleTicketsEvent message → the outage model mapping

CreatedTroubleTickets message			Description	Outage model		
Section	**Property**	**Type**		**Property**	**Type**	**Model Code**
Header	**Verb**	String	Identifier for a specific action to be taken. For this message Verb is created.	Populated by external system	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is TroubleTickets.	Populated by external system	N/A	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by external system	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by external system	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message Source can be: CallCenter, IVR, Portal, etc.	Populated by external system	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by external system	N/A	N/A
Header	**CorrelationID**	String	Same as message ID.	Populated by external system	N/A	N/A
Payload	callBack	Boolean	Indication whether the caller has requested the callback or not	CallBackReq	Boolean	OMS_PHONE_CALL_EVENT_CALLBACK_REQ
Payload	comment	String	Comment submitted with a trouble ticket	Comment	String	OMS_PHONE_CALL_EVENT_COMMENT
Payload	createdDateTime	DateTime	Time of the event. Caller can report that the problem occurred sometimes earlier than the trouble ticket received	EventTime	DateTime	OMS_TROUBLE_EVENT_EVENTTIME
Payload	csrId	String	Customer Service Representative that submitted the trouble ticket	RecUser	String	OMS_TROUBLE_EVENT_RECUSER

CreatedTroubleTickets message			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Payload	firstCallDateTime	DateTime	Received time of trouble ticket	RecTime	DateTime	OMS_TROUBLE_EVENT_RECTIME
Payload	languageId	Integer	Language ID for the caller. English: 1033, Spanish (US): 21514	LanguageID	Long	OMS_PHONE_CALL_LANGUAGE_ID
Payload	name	String	Unique identifier of trouble ticket in external system	ExternalSystemID	String	OMS_PHONE_CALL_EVENT_CUSTOMID
Payload	source	String	Source of the trouble ticket: CallCenter, IVR, Portal, etc.	CallSource	Enum	OMS_TROUBLE_EVENT_CALLSOURCE
Payload	troubleCode	String	Determines the type of trouble ticket. Some of the values: No Power/No Light, Flick Light/Partial Light, Power Restored, Not Restored, Voltage Problem	EventReason	Long	OMS_TROUBLE_EVENT_EVENTREASON
Payload	CallBacks. contactDetail	String	Prefered callBack media: SMS, mobile phone, landline phone, email, etc.	CallBackMedia	Long	OMS_PHONE_CALL_CALLBACK_COM_MEDIA_ REFS
Payload	CallBacks. Periods	DateTime	List of preferred callBack period intervals.	CallBackMedia	Long	OMS_PHONE_CALL_CALLBACK_START_TIMES OMS_PHONE_CALL_CALLBACK_END_TIMES
Payload	CustomerData	ErpPerson	Detailed information is given in Table 10.2	CallerContactRef	Long	OMS_PHONE_CALL_CALLER_CONTACT_REF
Payload	IncidentHazard. mRID	String	List of hazardous situations associated with a trouble ticket. Examples are line down, gas leak, fire, etc. Also, this property is used to indicate whether the call was made by the special caller, such as police/fire department.	HazTypeRefs	List<Long>	OMS_PHONE_CALL_EVENT_HAZTYPEREFS
Payload	Location	Location	Used for location based trouble tickets (trouble tickets that are not connected to any electrical device). Contains information about the search type and search criteria.	EventLocation	String	OMS_TROUBLE_EVENT_LOCATION
Payload	UsagePoint. mRID	String	Custom ID of the SDP that is originator of a trouble ticket	SdpCustomID	String	OMS_TROUBLE_EVENT_SDP_CUSTOM_ID

Table 10.2 defines mapping of TroubleTicket.CustomerData entity against outage model. CustomerData is modeled so that it can carry information about three most common contact types: email, landline and mobile phone for a specific person.

Table 10.2 – The customer data → the outage model mapping

CustomerData			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Payload	firstName	String	Person's first name.	FirstName	String	OMS_CALLER_CONTACT_FIRST_NAME
Payload	lastName	String	Person's last (family, sir) name.	LastName	String	OMS_CALLER_CONTACT_LAST_NAME
Payload	mName	String	Middle name(s) or initial(s).	N/A	N/A	N/A
Payload	electronicAddress. email1	String	Electronic address. Primary email address.	Type, Value	String	OMS_CALLER_CONTACT_TYPE OMS_CALLER_CONTACT_VALUE
Payload	landlinePhone. localNumber	TelephoneNumber	Landline phone number.	Type, Value	String	OMS_CALLER_CONTACT_TYPE OMS_CALLER_CONTACT_VALUE
Payload	mobilePhone. localNumber	TelephoneNumber	Mobile phone number.	Type, Value	String	OMS_CALLER_CONTACT_TYPE OMS_CALLER_CONTACT_VALUE

Table 10.3 – The location → the outage model mapping

Location			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Note: Location highly depends on available landbase data, meaning that attributes given in this table must contain exact values of landbase objects from imported landbase schema.						
Payload	type	String	Search type value from landbase search configuration file.	EventLocation	String	OMS_TROUBLE_EVENT_LOCATION
Payload	description	String	Search parameter name from landbase search configuration file	EventLocation	String	OMS_TROUBLE_EVENT_LOCATION
Payload	name	String	Search parameter value from landbase search configuration file.	EventLocation	String	OMS_TROUBLE_EVENT_LOCATION
Payload	PostionPoint. xPosition	String	X coordinate of the trouble ticket.	EventLocation	String	OMS_TROUBLE_EVENT_LOCATION
Payload	PostionPoint. yPosition	String	Y coordinate of the trouble ticket.	EventLocation	String	OMS_TROUBLE_EVENT_LOCATION

10.2.2. Response

After trouble tickets are created, the response is returned in form of the *CreatedTroubleTicketsResponse* message. Besides mRID, status and previous trouble tickets count, the response message contains the information about an incident if the reported customer is already affected by any. The content of the response message is given in Figure 10.7.

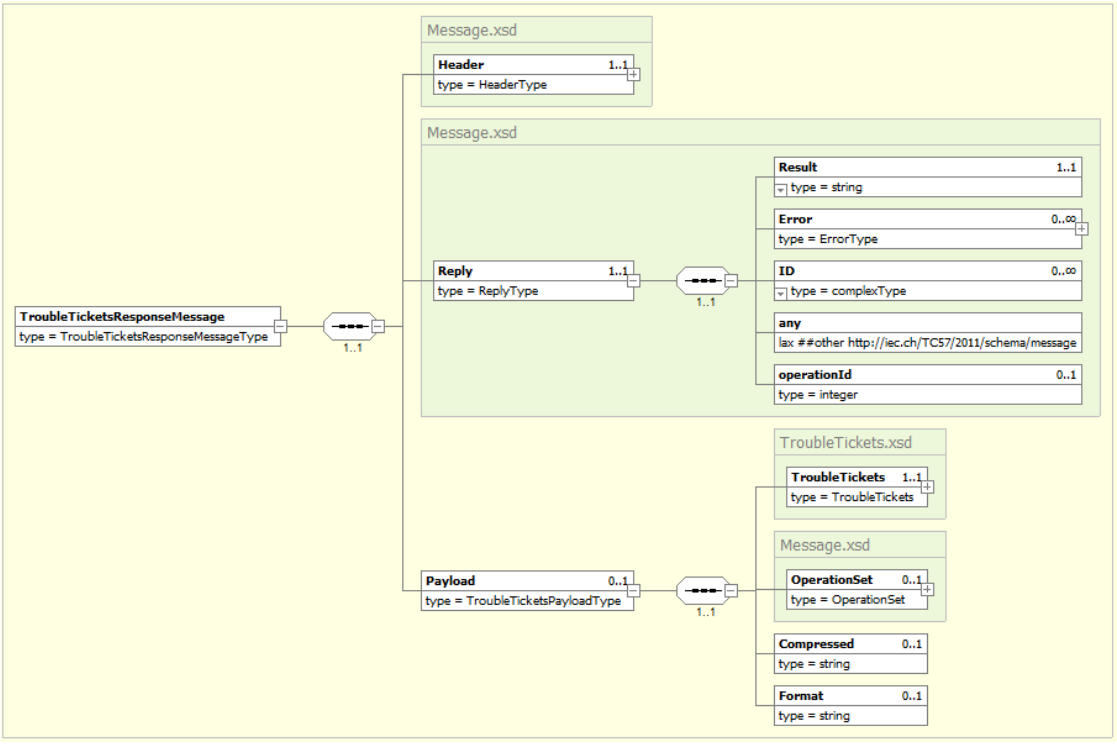

Figure 10.7 – The TroubleTicketsResponse message

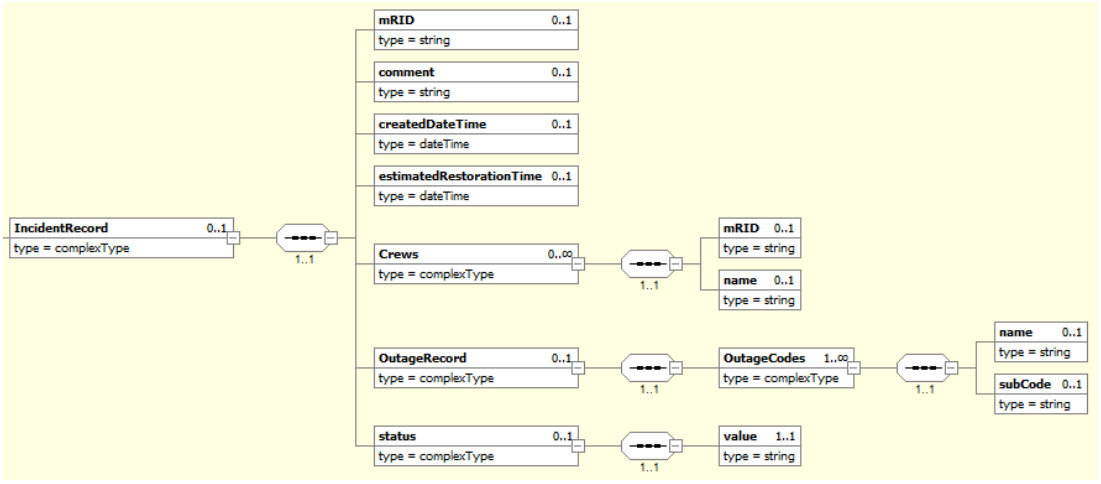

Figure 10.8 – The IncidentRecord object

Table 10.4 defines the mapping between the *TroubleTickets.xsd* and the appropriate entities in the outage model for the response message.

Table 10.4 – The TroubleTicketsResponse message → the outage model mapping

TroubleTicketsResponse message			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Header	**Verb**	String	Identifier for a specific action to be taken. For this message Verb is reply.	Populated by CRM Adapter	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is TroubleTickets.	Populated by CRM Adapter	N/A	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by CRM Adapter	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by CRM Adapter	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message Source is EcoStruxure GridOps.	Populated by CRM Adapter	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by CRM Adapter	N/A	N/A
Header	**CorrelationID**	String	Same as correlation ID from request message.	Populated by CRM Adapter	N/A	N/A
Reply	**Result**	String	Returned as part of synchronous response. Valid values are: OK, PARTIAL or FAILED.	N/A	N/A	N/A
Payload	mRID	String	Unique identifier of trouble ticket. Generated by EcoStruxure GridOps and returned within a response message	CustomID	String	OMS_IMSOBJ_UID
Payload	status.value	String	Used to set the information about the trouble ticket creation result. In case of customer call (SDP based), it carries the information about the current energization status of the SDP.	Populated by CRM Adapter	String	N/A
Payload	previousTroubleTicketsCount	Integer	Number of previous trouble tickets reported by this customer	Populated by CRM Adapter	Integer	N/A

TroubleTicketsResponse message			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Payload	IncidentRecord	Incident Record	In case when the reported customer is already affected by an existing incident, IncidentRecord attribute contains basic information about the mentioned incident. If the customer is not affected by an existing incident, attribute will not be populated. Detailed information is given in **Table 10.5**	Populated by CRM Adapter	N/A	N/A
Payload	Location	Location	Used for location based trouble tickets (trouble tickets that are not connected to any electrical device). Contains information about the search type and search criteria. Detailed information is given in Table 10.3.	EventLocation	String	OMS_TROUBLE_EVENT_LOCATION
Payload	UsagePoint. mRID	String	Custom ID of the SDP that is originator of a trouble ticket	SdpCustomID	String	OMS_TROUBLE_EVENT_SDP_CUSTOM_ID

Table 10.5 – IncidentRecord → the outage model mapping

IncidentRecord			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Payload	mRID	String	Unique identifier of the incident. Generated by EcoStruxure GridOps.	CustomID	String	OMS_IMSOBJ_UID
Payload	comment	String	Comments for incident entered by the operator.	NoteRefs	Long	OMS_INCIDENT_NOTEREFS
Payload	createdDateTime	DateTime	Creation time of the incident	CreateTime	DateTime	OMS_INCIDENT_CREATE_TIME
Payload	estimatedRestorationTime	DateTime	Estimated end time of the incident	EstimatedEndTime	DateTime	OMS_INCIDENT_ESTIMATED_END_TIME
Payload	Crews	List<Crew>	IDs and Names of the crews assigned to the incident	CrewRefs	List<Long>	OMS_INCIDENT_INCIDENT_CREW_REFS
Payload	OutageRecord. OutageCodes. name	String	Incident cause.	IncidentCauseRef	Long	OMS_INCIDENT_CAUSEREF

IncidentRecord			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Payload	OutageRecord. OutageCodes. subCode	String	Incident subcause.	IncidentSubCasuseRef	Long	OMS_INCIDENT_SUBCAUSEREF
Payload	status.value	String	Incident status, Examples: New, In Progress, Assigned, Dispatched, En Route, Arrived, Suspended.	IncidentStatusRef	Long	OMS_INCIDENT_STATUSREF

10.2.3. Fault

The *TroubleTicketsFault* message is depicted in Figure 10.9.

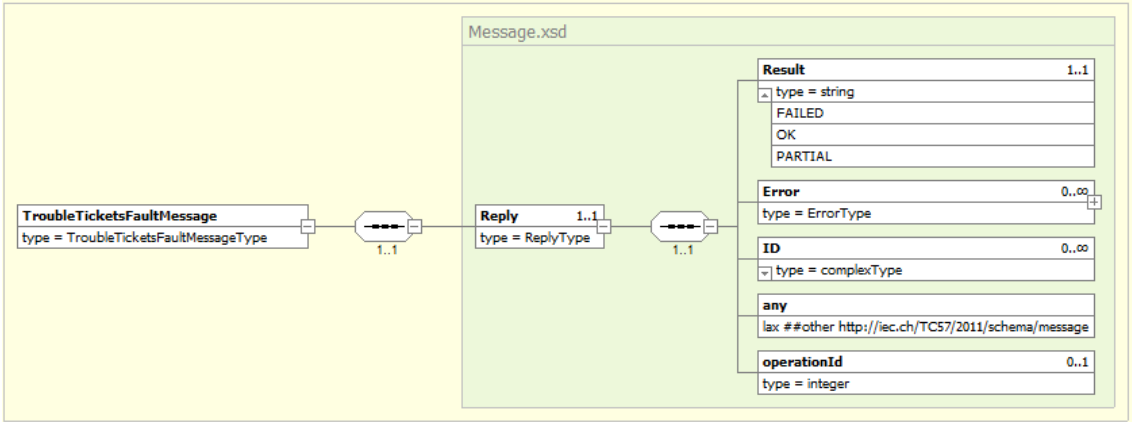

Figure 10.9 – The TroubleTicketsFault message

10.3. ChangedTroubleTickets Operation Messages

The operation definition:

ChangedTroubleTicketsResponse ChangedTroubleTickets(ChangedTroubleTicketsEvent)

10.3.1. Request

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

- Header
- Payload

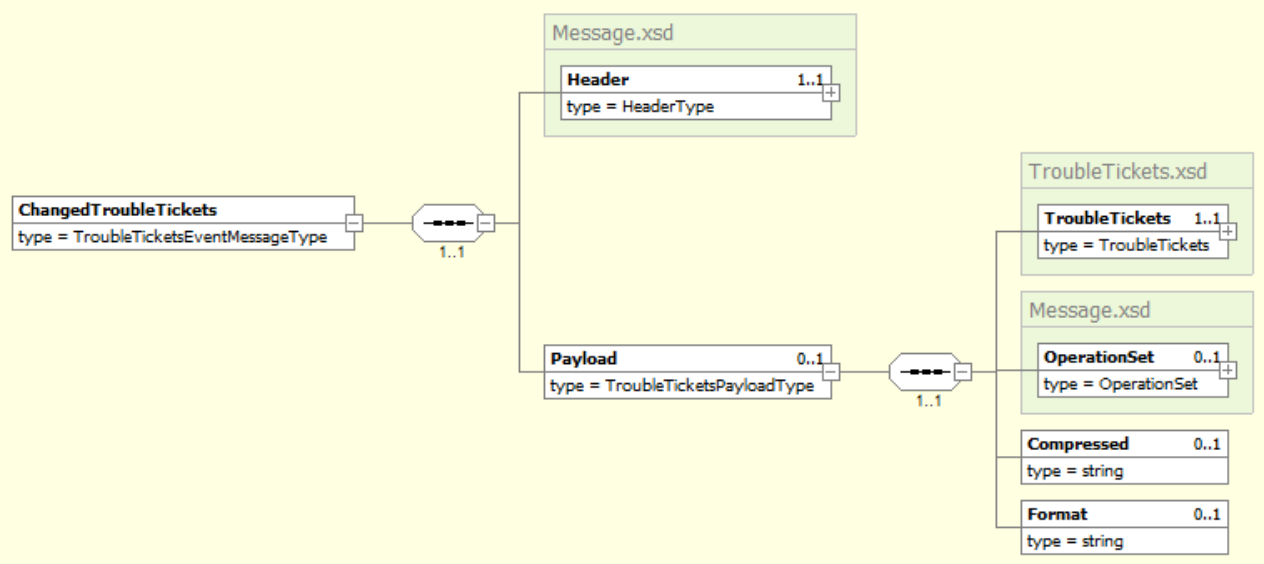

Figure 10.10 – The ChangedTroubleTicketsEvent message

The Payload section carries the CIM defined profile (*TroubleTickets.xsd*) for update of one or several trouble ticket's comments. The visual representation of the *TroubleTickets.xsd* schema is given in Figure 10.4.

Even though the same schema is used for update operation like for the insert operation, only attributes given in Table 10.6 (the comment field) can be updated from the external system, based on the given mRID of the trouble ticket.

Table 10.6 – The ChangedTroubleTicketsEvent message → the outage model mapping

ChangedTroubleTickets message			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Header	**Verb**	String	Identifier for a specific action to be taken. For this message Verb is changed.	Populated by external system	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is TroubleTickets.	Populated by external system	N/A	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by external system	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by external system	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message Source can be: CallCenter, IVR, Portal, etc.	Populated by external system	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by external system	N/A	N/A
Header	**CorrelationID**	String	Same as message ID.	Populated by external system	N/A	N/A
Payload	mRID	String	Unique identifier of the trouble ticket.	CustomID	String	OMS_IMSOBJ_UID
Payload	name	String	Unique identifier of trouble ticket in external system	ExternalSystemID	String	OMS_PHONE_CALL_EVENT_CUSTOMID
Payload	comment	String	Comment field that will be appended to comment value currently existing in Outage model for appropriate trouble ticket.	Comment	String	OMS_PHONE_CALL_EVENT_COMMENT
Payload	**csrId**	String	User that changed the trouble ticket.	LastUpdateUser	String	OMS_PHONE_CALL_EVENT_LAST_UPDATE_USER
Payload	CustomerData	ErpPerson	Detailed information is given in Table 10.2	CallerContactRef	Long	OMS_PHONE_CALL_CALLER_CONTACT_REF

10.3.2. Response

After trouble tickets are updated, the response is returned in the form of the *TroubleTickets* response message. The unique identifier of the changed trouble ticket along with its status is returned within the response message. The content is given in Figure 10.7.

Table 10.7 – The TroubleTicketsResponse message → the outage model mapping

TroubleTicketsResponse message			Description	Outage model		
Section	**Property**	**Type**		**Property**	**Type**	**Model Code**
Header	**Verb**	String	Identifier for a specific action to be taken. For this message, Verb is reply.	Populated by CRM Adapter	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message, Noun is TroubleTickets.	Populated by CRM Adapter	N/A	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by CRM Adapter	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by CRM Adapter	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message, Source is EcoStruxure GridOps.	Populated by CRM Adapter	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by CRM Adapter	N/A	N/A
Header	**CorrelationID**	String	Same as correlation ID from request message.	Populated by CRM Adapter	N/A	N/A
Reply	**Result**	String	Returned as part of synchronous response. Valid values: OK, PARTIAL or FAILED.	N/A	N/A	N/A
Payload	mRID	String	Unique identifier of the trouble ticket.	CustomID	String	OMS_IMSOBJ_UID
Payload	status.value	String	Used to set the information about the trouble ticket update result.	Populated by CRM Adapter	String	N/A

10.3.3. Fault

The *TroubleTicketsFault* message is depicted in Figure 10.9.

10.4. GetTroubleTickets Operation Messages

The operation definition:

GetTroubleTicketsResponse GetTroubleTickets(*GetTroubleTicketsRequest*)

10.4.1. Request

The *GetTroubleTickets* request message is defined according to the IEC 61968-100 and contains the following three sections:

- Header
- Request
- Payload

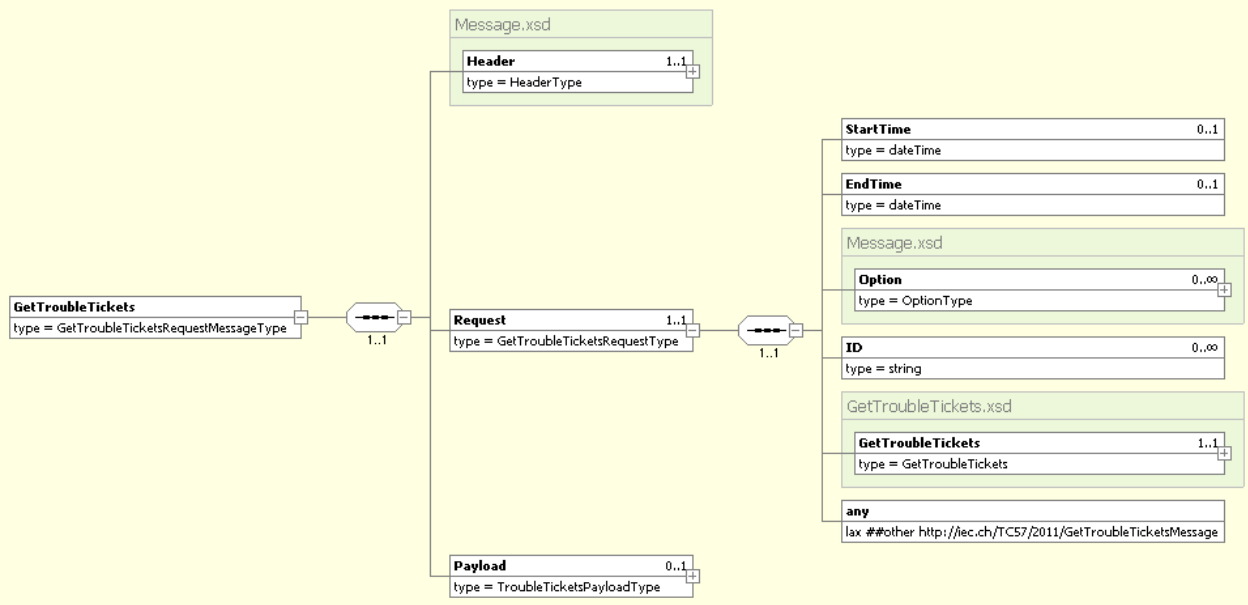

Figure 10.11 – The GetTroubleTickets request message

The Request message contains the payload in form of the *GetTroubleTickets.xsd* schema while the response message contains the the payload in the form of the *TroubleTickets.xsd* schema which represents the CIM Profile for trouble tickets. The visual representation of the *TroubleTickets.xsd* schema is given in Figure 10.4 while the *GetTroubleTickets.xsd* is shown in Figure 10.12.

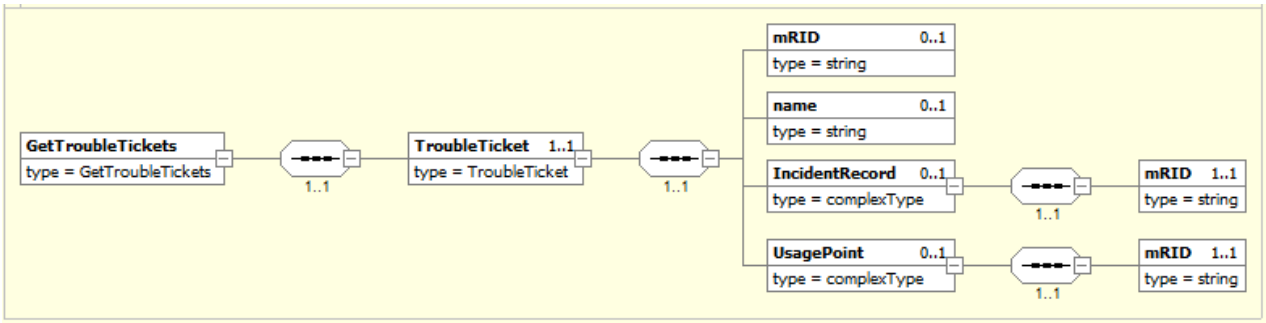

Figure 10.12 – GetTroubleTickets.xsd

Table 10.8 defines the mapping between the *GetTroubleTickets.xsd* and the appropriate entities in the outage model.

Table 10.8 – The GetTroubleTickets message → the outage model mapping

GetTroubleTickets message			Description	Outage model		
Section	**Property**	**Type**		**Property**	**Type**	**Model Code**
Header	**Verb**	String	Identifier for a specific action to be taken. For this message, Verb is get.	Populated by external system	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message, Noun is TroubleTickets.	Populated by external system	N/A	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by external system	N/A	N/A
Header	**Context**	String	Context of the trouble ticket information that needs to be pulled. Valid values: active, archived and all.	Populated by external system	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by external system	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message Source can be: CallCenter, IVR, Portal, etc.	Populated by external system	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by external system	N/A	N/A
Header	**CorrelationID**	String	Same as message ID.	Populated by external system	N/A	N/A
Request	mRID	String	Unique identifier of the trouble ticket. Generated by EcoStruxure GridOps.	CustomID UID	String nvarchar(MAX)	OMS_IMSOBJ_UID UID
Request	name	String	Unique identifier of the trouble ticket in external system.	Name Name	String nvarchar(MAX)	OMS_PHONE_CALL_EVENT_CUSTOMID OMS_PHONE_CALL_EVENT_CUSTOMID
Request	UsagePoint. mRID	String	Unique identifier of the service delivery point.	SPDCustomID SPDCustomID	String nvarchar(MAX)	OMS_TROUBLE_EVENT_SDP_CUSTOM_ID OMS_TROUBLE_EVENT_SDP_CUSTOM_ID

GetTroubleTickets message			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Request	IncidentRecord. mRID	String	Unique identifier of the incident. Generated by EcoStruxure GridOps.	Incident.CustomID INCIDENTUID	String nvarchar(MAX)	OMS_IMSOBJ_UID UID

10.4.2. Response

After the *GetTroubleTickets* operation is invoked, the appropriate trouble tickets are returned within the *TroubleTicketsResponse* message. The content of the response message is given in Figure 10.13.

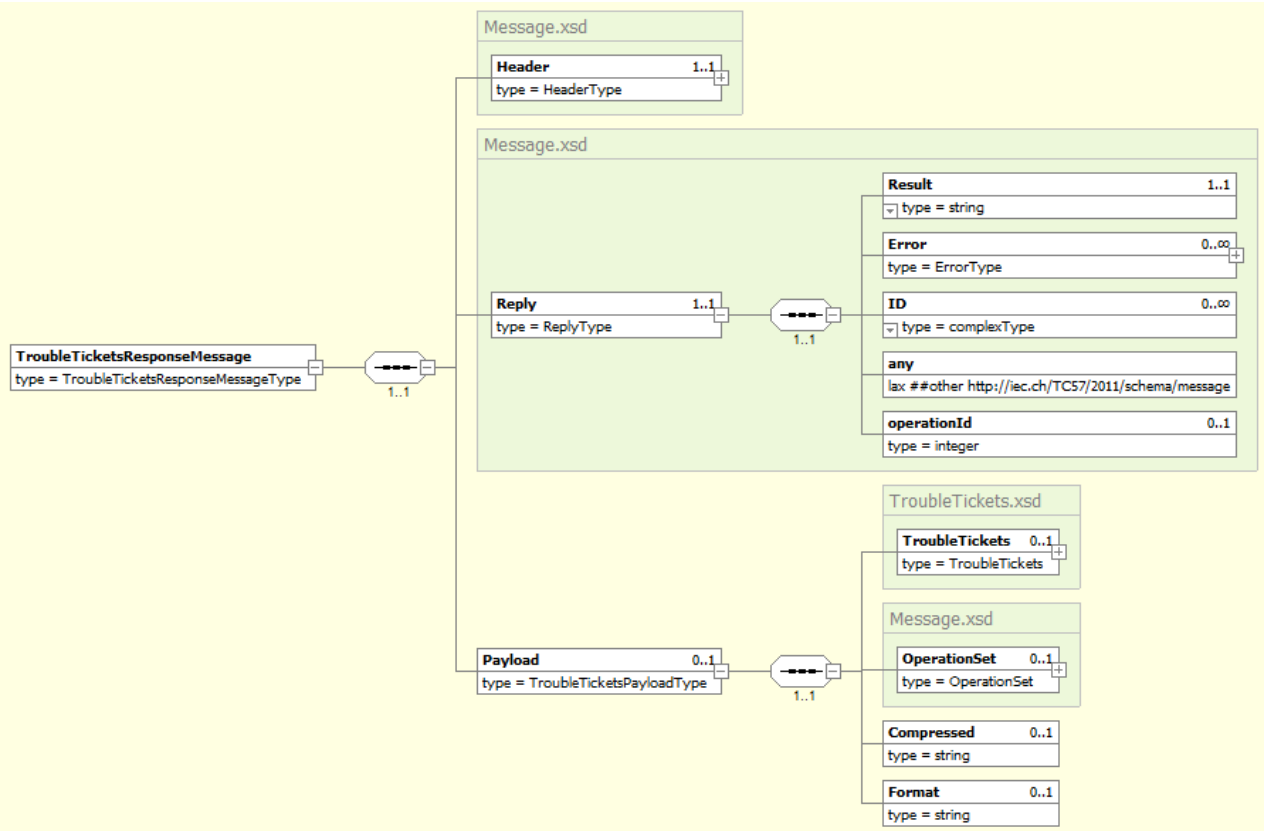

Figure 10.13 – The TroubleTicketsResponse message

Depending on the information provided in the *GetTroubleTickets* request message, the response message contains different level of details related to trouble tickets.

In case when the request message contains the unique identifier of the incident (mRID), the response message to the calling system contains only basic information for all trouble tickets related to the incident with the provided unique identifier.

Table 10.9 defines the mapping between the *TroubleTickets.xsd* and the appropriate entities in the outage model for the response message when the external system requested all **active** trouble tickets related to the one incident or usage point.

Table 10.9 – The TroubleTicketsResponse message → the outage model mapping (limited details)

TroubleTicketsResponse message			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Header	**Verb**	String	Identifier for a specific action to be taken. For this message Verb is reply.	Populated by CRM Adapter	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is TroubleTickets.	Populated by CRM Adapter	N/A	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by CRM Adapter	N/A	N/A
Header	**Context**	String	Same as Context from request message. Valid values: active, archived and all.	Populated by CRM Adapter	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by CRM Adapter	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message Source is EcoStruxure GridOps.	Populated by CRM Adapter	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by CRM Adapter	N/A	N/A
Header	**CorrelationID**	String	Same as correlation ID from request message.	Populated by CRM Adapter	N/A	N/A
Reply	**Result**	String	Returned as part of synchronous response. Valid values are: OK, PARTIAL or FAILED.	Populated by CRM Adapter	N/A	N/A
Payload	mRID	String	Unique identifier of trouble ticket. Generated by EcoStruxure GridOps and returned within a response message	CustomID	String	OMS_IMSOBJ_UID
Payload	callBack	Boolean	Indication whether the caller has requested the callback or not	CallBackReq	Boolean	OMS_PHONE_CALL_EVENT_CALLBACK_REQ

TroubleTicketsResponse message			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Payload	comment	String	Comment submitted with a trouble ticket	Comment	String	OMS_PHONE_CALL_EVENT_COMMENT
Payload	createdDateTime	DateTime	Time of the event. Caller can report that the problem occurred sometimes earlier than the trouble ticket received	EventTime	DateTime	OMS_TROUBLE_EVENT_EVENTTIME
Payload	source	String	Source of the trouble ticket: CallCenter, IVR, Portal, etc.	CallSource	Enum	OMS_TROUBLE_EVENT_CALLSOURCE
Payload	troubleCode	String	Determines the type of trouble ticket. Some of the values: No Power/No Light, Flick Light/Partial Light, Power Restored, Not Restored, Voltage Problem	EventReason	Long	OMS_EVENT_REASON_NAME
Payload	Location	Location	Used for unlocated trouble tickets, trouble tickets that are not connected to any electrical device. Contains information about the Pole ID, primary and secondary street address (if a trouble ticket is reported on the intersection). Detailed information about the address is given in Table 10.3.	EventLocation	String	OMS_TROUBLE_EVENT_LOCATION
Payload	UsagePoint. mRID	String	Custom ID of the SDP that is originator of a trouble ticket. For unlocated calls this field is not populated.	SdpCustomID	String	OMS_TROUBLE_EVENT_SDP_CUSTOM_ID

When the trouble ticket information is requested by the unique identifier of the trouble ticket, more details for the specified trouble ticket are provided to the calling system. Table 10.10 defines the mapping between the *TroubleTickets.xsd* and the appropriate entities in the outage model for the response message when the **active** trouble ticket information is requested by the trouble ticket unique identifier or name (external system ID).

Table 10.10 – The TroubleTicketResponse message → the outage model mapping

TroubleTicketsResponse message			Description	Outage Model		
Section	Property	Type		Property	Type	Model Code
Header	**Verb**	String	Identifier for a specific action to be taken. For this message, Verb is reply.	Populated by CRM Adapter	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is TroubleTickets.	Populated by CRM Adapter	N/A	N/A

TroubleTicketsResponse message			Description	Outage Model		
Section	Property	Type		Property	Type	Model Code
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by CRM Adapter	N/A	N/A
Header	**Context**	String	Same as Context from request message. Valid values: active, archived and all.	Populated by CRM Adapter	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by CRM Adapter	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message Source can be EcoStruxure GridOps.	Populated by CRM Adapter	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by CRM Adapter	N/A	N/A
Header	**CorrelationID**	String	Same as correlation ID from request message.	Populated by CRM Adapter	N/A	N/A
Reply	**Result**	String	Returned as part of synchronous response. Valid values are: OK, PARTIAL or FAILED.	N/A	N/A	N/A
Payload	mRID	String	Unique identifier of trouble ticket. Generated by EcoStruxure GridOps and returned within a response message	CustomID	String	OMS_IMSOBJ_UID
Payload	callBack	Boolean	Indication whether the caller has requested the callback or not	CallBackReq	Boolean	OMS_PHONE_CALL_EVENT_CALLBACK_REQ
Payload	comment	String	Comment submitted with a trouble ticket	Comment	String	OMS_PHONE_CALL_EVENT_COMMENT
Payload	createdDateTime	DateTime	Time of the event. Caller can report that the problem occurred sometimes earlier than the trouble ticket received	EventTime	DateTime	OMS_TROUBLE_EVENT_EVENTTIME
Payload	csrId	String	Customer Service Representative that submitted the trouble ticket	RecUser	String	OMS_TROUBLE_EVENT_RECUSER
Payload	firstCallDateTime	DateTime	Received time of trouble ticket	RecTime	DateTime	OMS_TROUBLE_EVENT_RECTIME

TroubleTicketsResponse message			Description	Outage Model		
Section	Property	Type		Property	Type	Model Code
Payload	languageId	Integer	Language ID for the caller	LanguageID	Long	OMS_PHONE_CALL_LANGUAGE_ID
Payload	source	String	Source of the trouble ticket: CallCenter, IVR, Portal, etc.	CallSource	Enum	OMS_TROUBLE_EVENT_CALLSOURCE
Payload	troubleCode	String	Determines the type of trouble ticket. Some of the values: No Power/No Light, Flick Light/Partial Light, Power Restored, Not Restored, Voltage Problem	EventReason	Long	OMS_EVENT_REASON_NAME
Payload	CustomerData	ErpPerson	Detailed information is given in Table 10.2. It is important to note that more the 1 contact type per person can exist (i.e. two email addresses). In that case, due to profile definition, first contact value for that specific type is mapped. This rule is overridden only by existence of a preferred contact types.	CallerContactRef	Long	OMS_PHONE_CALL_CALLER_CONTACT_REF
Payload	IncidentHazard.mRID	String	List of hazardous situations associated with a trouble ticket. Examples are line down, gas leak, fire, etc.	HazTypeRefs	List<Long>	OMS_PROBLEM_TYPE_NAME
Payload	Location	Location	Used for location based trouble tickets (trouble tickets that are not connected to any electrical device). Contains information about the search type and search criteria. Detailed information is given in Table 10.3.	EventLocation	String	OMS_TROUBLE_EVENT_LOCATION
Payload	IncidentRecord	Incident Record	In case when the reported customer is already affected by an existing incident, IncidentRecord attribute contains basic information about the mentioned incident. If the customer is not affected by an existing incident, attribute will not be populated. Detailed information is given in Table 10.5	Populated by CRM Adapter	N/A	OMS_TROUBLE_EVENT_INCIDENTREF
Payload	UsagePoint.mRID	String	Custom ID of the SDP that is originator of a trouble ticket.	SdpCustomID	String	OMS_TROUBLE_EVENT_SDP_CUSTOM_ID

In situation when the external system requests the **archived** trouble ticket data related to the one incident or usage point, Table 10.11 contains the mapping between the *TroubleTickets.xsd* and the appropriate entities in the Operations database.

Table 10.11 – The TroubleTicketsResponse message → the Operations database mapping (limited details)

TroubleTickets.xsd			Description	Operations database	
Section	Property	Type		Property	Type
Header	**Verb**	String	Identifier for a specific action to be taken. For this message Verb is reply.	Populated by CRM Adapter	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is TroubleTickets.	Populated by CRM Adapter	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by CRM Adapter	N/A
Header	**Context**	String	Same as Context from request message. Valid values: active, archived and all.	Populated by CRM Adapter	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by CRM Adapter	N/A
Header	Source	String	Source system or application that sends the message. For this message Source is EcoStruxure GridOps	Populated by CRM Adapter	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by CRM Adapter	N/A
Header	**CorrelationID**	String	Same as correlation ID from request message.	Populated by CRM Adapter	N/A
Reply	**Result**	String	Returned as part of synchronous response. Valid values are: OK, PARTIAL or FAILED.	N/A	N/A
Payload	mRID	String	Unique identifier of trouble ticket. Generated by EcoStruxure GridOps and returned within a response message	UID	nvarchar(MAX)
Payload	callBack	Boolean	Indication whether the caller has requested the callback or not	CALLBACK_REQUIRED	bit
Payload	comment	String	Comment submitted with a trouble ticket	COMMENT	nvarchar(MAX)
Payload	createdDateTime	DateTime	Time of the event. Caller can report that the problem occurred sometimes earlier than the trouble ticket received	EVENT_TIME	datetime
Payload	source	String	Source of the trouble ticket: CC, IVR, OutagePortal, Operator, Unknown.	CALL_SOURCE_ID	smallint
Payload	troubleCode	String	Determines the type of trouble ticket. Some of the values: No Power/No Light, Flick Light/Partial Light, Power Restored, Not Restored, Voltage Problem	EVENT_REASON_GID	bigint
Payload	Location	Location	Used for location-based trouble tickets (trouble tickets that are not connected to any electrical device). Contains information about the search type and search criteria. Detailed information is given in Table 10.3.	LOCATION	nvarchar(MAX)

TroubleTickets.xsd			Description	Operations database	
Section	Property	Type		Property	Type
Payload	UsagePoint. mRID	String	Custom ID of the SDP that is originator of a trouble ticket. For unlocated calls this field is not populated.	SERVICE_DELIVERY_POINT_CUSTOMID	nvarchar(MAX)

When the **archived** trouble ticket information is requested by the unique identifier of the trouble ticket or name (external system ID) more details for the specified trouble ticket are provided to the calling system. Table 10.12 defines the mapping between the *TroubleTickets.xsd* and the appropriate entities in the Operations database for the response message when the archived trouble ticket information is requested by the trouble ticket unique identifier.

Table 10.12 – The TroubleTicketsResponse message → the Operations database mapping

TroubleTickets.xsd			Description	Operations database	
Section	Property	Type		Property	Type
Header	**Verb**	String	Identifier for a specific action to be taken. For this message Verb is reply.	Populated by CRM Adapter	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is TroubleTickets.	Populated by CRM Adapter	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by CRM Adapter	N/A
Header	**Context**	String	Same as Context from request message. Valid values: active, archived and all.	Populated by CRM Adapter	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by CRM Adapter	N/A
Header	Source	String	Source system or application that sends the message. For this message Source is EcoStruxure GridOps	Populated by CRM Adapter	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by CRM Adapter	N/A
Reply	**Result**	String	Returned as part of synchronous response. Valid values are: OK, PARTIAL or FAILED.	N/A	N/A
Header	**CorrelationID**	String	Same as correlation ID from request message.	Populated by CRM Adapter	N/A
Payload	mRID	String	Unique identifier of trouble ticket. Generated by EcoStruxure GridOps and returned within a response message	UID	nvarchar(MAX)

TroubleTickets.xsd			Description	Operations database	
Section	Property	Type		Property	Type
Payload	callBack	Boolean	Indication whether the caller has requested the callback or not	CALLBACK_REQUIRED	bit
Payload	comment	String	Comment submitted with a trouble ticket	COMMENT	nvarchar(MAX)
Payload	createdDateTime	DateTime	Time of the event. Caller can report that the problem occurred sometimes earlier than the trouble ticket received	EVENT_TIME	datetime
Payload	csrId	String	Customer Service Representative that submitted the trouble ticket	RECEIVED_USER	nvarchar(MAX)
Payload	firstCallDateTime	DateTime	Received time of trouble ticket	RECEIVED_TIME	datetime
Payload	source	String	Source of the trouble ticket: CC, IVR, OutagePortal, Operator, Unknown.	CALL_SOURCE_ID	smallint
Payload	troubleCode	String	Determines the type of trouble ticket. Some of the values: No Power/No Light, Flick Light/Partial Light, Power Restored, Not Restored, Voltage Problem	EVENT_REASON_GID	bigint
Payload	CustomerData	ErpPerson	Detailed information is given in Table 10.2.	CALLER_CONTACT_GID	Long
Payload	IncidentHazard. mRID	String	List of hazardous situations associated with a trouble ticket. Examples are line down, gas leak, fire, etc.	PHONE_CALL_EVENT_PROBLEM PROBLEM_TYPE_GID	bigint
Payload	Location	Location	Used for location based trouble tickets (trouble tickets that are not connected to any electrical device). Contains information about the search type and search criteria. Detailed information is given in Table 10.3	LOCATION	nvarchar(MAX)
Payload	IncidentRecord	Incident Record	In case when the reported customer is already affected by an existing incident, IncidentRecord attribute contains basic information about the mentioned incident. If the customer is not affected by an existing incident, attribute will not be populated. Detailed information is given in Table 10.5	Populated by CRM Adapter	N/A
Payload	UsagePoint.mRID	String	Custom ID of the SDP that is originator of a trouble ticket	SERVICE_DELIVERY_POINT_CUSTOMID	nvarchar(MAX)

Table 10.13 – The customer data → the Operations database mapping

CustomerData			Description	Operations database	
Section	Property	Type		Property	Type
Payload	firstName	String	Person's first name.	FIRST_NAME	nvarchar(MAX)
Payload	lastName	String	Person's last (family, sir) name.	LAST_NAME	Nvarchar(MAX)
Payload	mName	String	Middle name(s) or initial(s).	Concatenated with first name	N/A
Payload	electronicAddress. email1	String	Electronic address. Primary email address.	TYPE, VALUE	nvarchar(MAX)
Payload	landlinePhone. localNumber	TelephoneNumber	Landline phone number.	TYPE, VALUE	nvarchar(MAX)
Payload	mobilePhone. localNumber	TelephoneNumber	Mobile phone number.	TYPE, VALUE	nvarchar(MAX)

Table 10.14 – The location → the Operations database mapping

Location			Description	Outage model	
Section	Property	Type		Property	Type
Note: Location highly depends on available landbase data, meaning that attributes given in this table must contain exact values of landbase objects from imported landbase schema.					
Payload	type	String	Search type value from landbase search configuration file.	LOCATION	nvarchar(MAX)
Payload	description	String	Search parameter name from landbase search configuration file	LOCATION	nvarchar(MAX)
Payload	name	String	Search parameter value from landbase search configuration file.	LOCATION	nvarchar(MAX)

Table 10.15 – IncidentRecord → the Operations database mapping

IncidentRecord			Description	Operations database	
Section	Property	Type		Property	Type
Payload	mRID	String	Unique identifier of the incident. Generated by EcoStruxure GridOps.	UID	nvarchar(MAX)

IncidentRecord			Description	Operations database	
Section	Property	Type		Property	Type
Payload	comment	String	Comments for incident entered by the operator.	NOTE	nvarchar(MAX)
Payload	createdDateTime	DateTime	Creation time of the incident	CreateTime	datetime
Payload	estimatedRestorationTime	DateTime	Estimated end time of the incident	ESTIMATED_END_TIME	datetime
Payload	Crews	List<Crew>	IDs and Names of the crews assigned to the incident	INCIDENT_CREW	N/A
Payload	OutageRecord. OutageCodes. name	String	Incident cause.	INCIDENT_CAUSE_GID	bigint
Payload	OutageRecord. OutageCodes. subCode	String	Incident subcause.	INCIDENT_SUBCAUSE_GID	bigint
Payload	status.value	String	Incident status: New, Dispatched, Field Completed, Closed, Archived, Cancelled.	INCIDENT_STATUS_GID	bigint

10.4.3. Fault

The *TroubleTicketsFault* message is depicted in Figure 10.14.

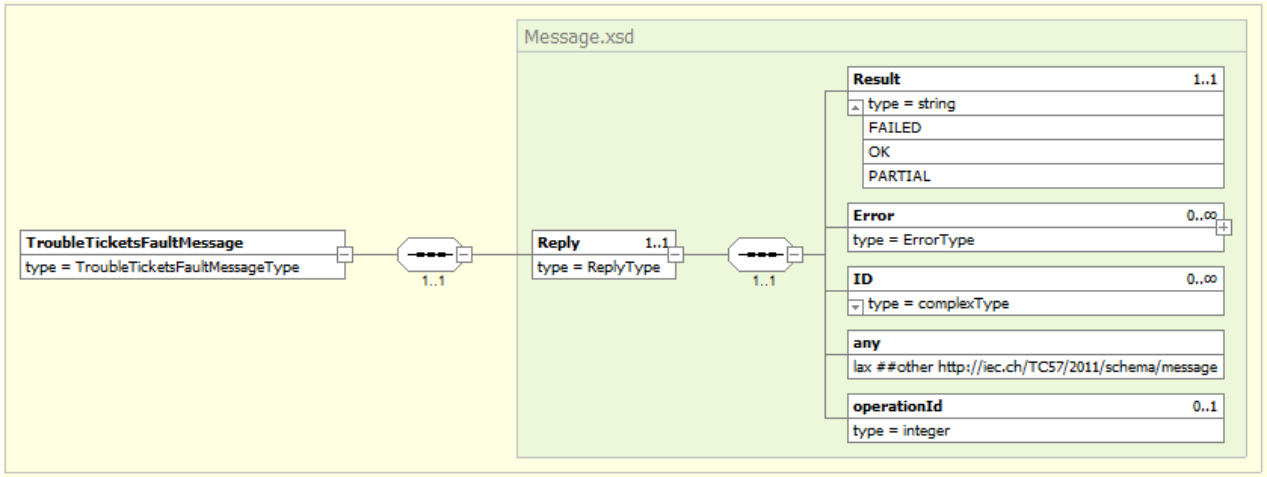

Figure 10.14 – The TroubleTicketsFault message

10.5. GetCallbacks Operation Messages

The operation definition:

GetCallBacksResponse GetCallBacks*(GetCallBacksRequest)*

10.5.1. Request

The *GetCallBacks* request message is defined according to the IEC 61968-100 and contains the following three sections:

- Header
- Request
- Payload

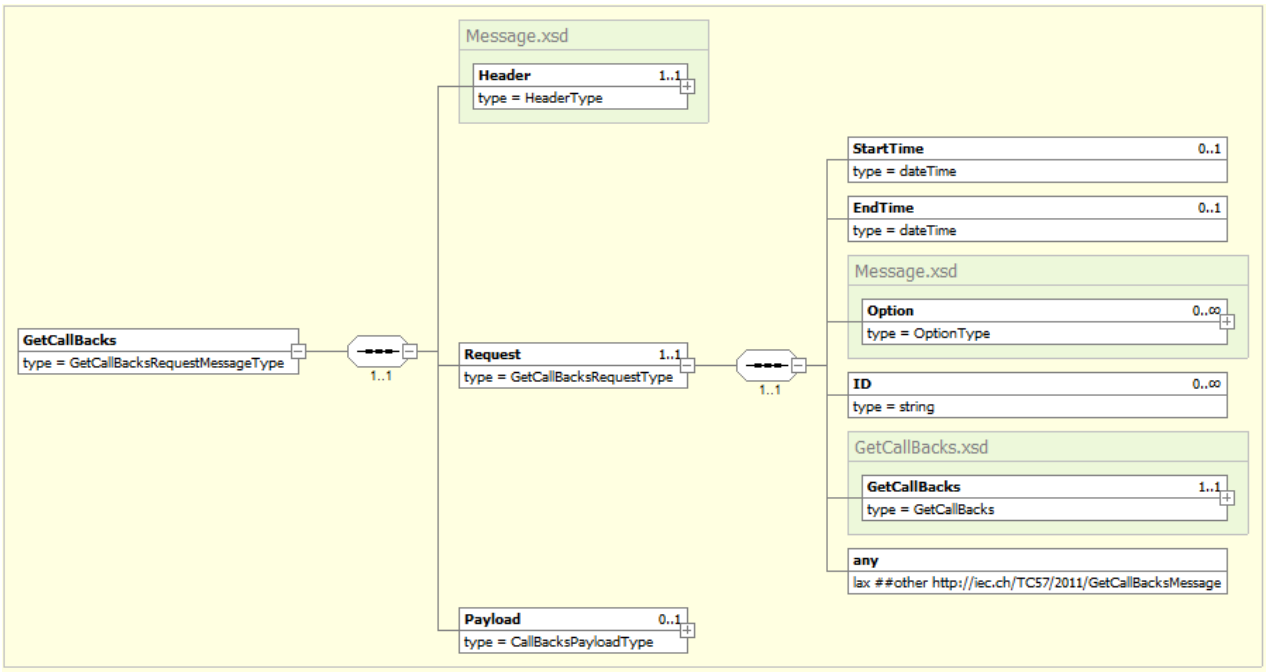

Figure 10.15 – The GetCallBacks request message

The Request section carries the CIM defined profile (*GetCallBacks.xsd*) based on which callback information is returned to the calling system. The visual representation of the aforementioned schema is given in Figure 10.16.

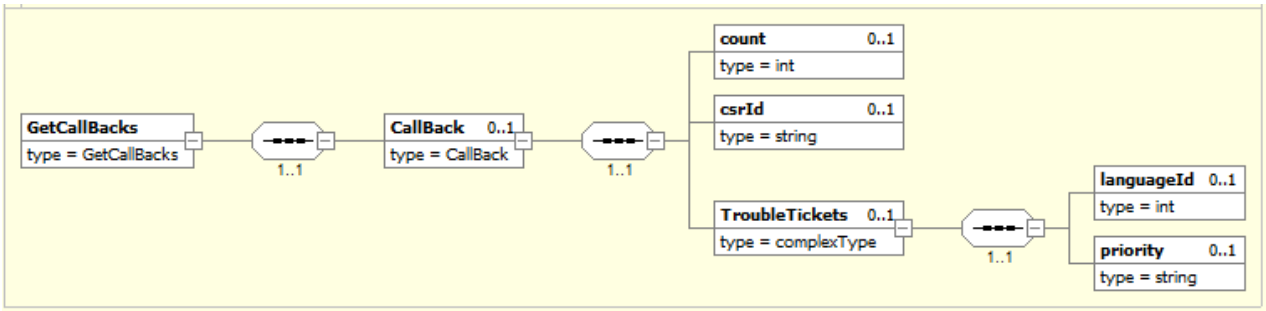

Figure 10.16 – GetCallBacks.xsd

Table 10.16 defines the mapping between the *GetCallBacks.xsd* and the appropriate entities in the outage model.

Table 10.16 – The GetCallBacks message → the outage model mapping

GetCallBacks message			Description	Outage model		
Section	**Property**	**Type**		**Property**	**Type**	**Model Code**
Header	**Verb**	String	Identifier for a specific action to be taken. For this message Verb is get.	Populated by external system	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is CallBacks.	Populated by external system	N/A	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by external system	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by external system	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message Source can be: CallCenter, IVR, Portal, etc.	Populated by external system	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by external system	N/A	N/A
Header	**CorrelationID**	String	Same as message ID.	Populated by external system	N/A	N/A
Request	count	Integer	Number of callbacks to be pulled.	N/A	N/A	N/A
Request	csrId	String	Customer Service Representative or external system that assigns callbacks.	AssignedUser	String	OMS_CALLBACK_ASSIGNED_USER
Request	TroubleTickets. languageId	Integer	Language ID for the customer. Valid values are – English: 1033, Spanish (US): 21514	LanguageId	Integer	OMS_CALLBACK_LANGUAGE_ID
Request	TroubleTickets. priority	String	Priority of the customer. Valid priorities are (from highest to lowest): 6, 5, 4, 3, 2, 1, 0 (None).	CustomerPriority	Integer	OMS_CALLBACK_PRIORITY

10.5.2. Response

After the *GetCallBacks* operation is invoked, the appropriate callbacks are returned within the *CallBacksResponse* message. The content of the response message is given in Figure 10.17.

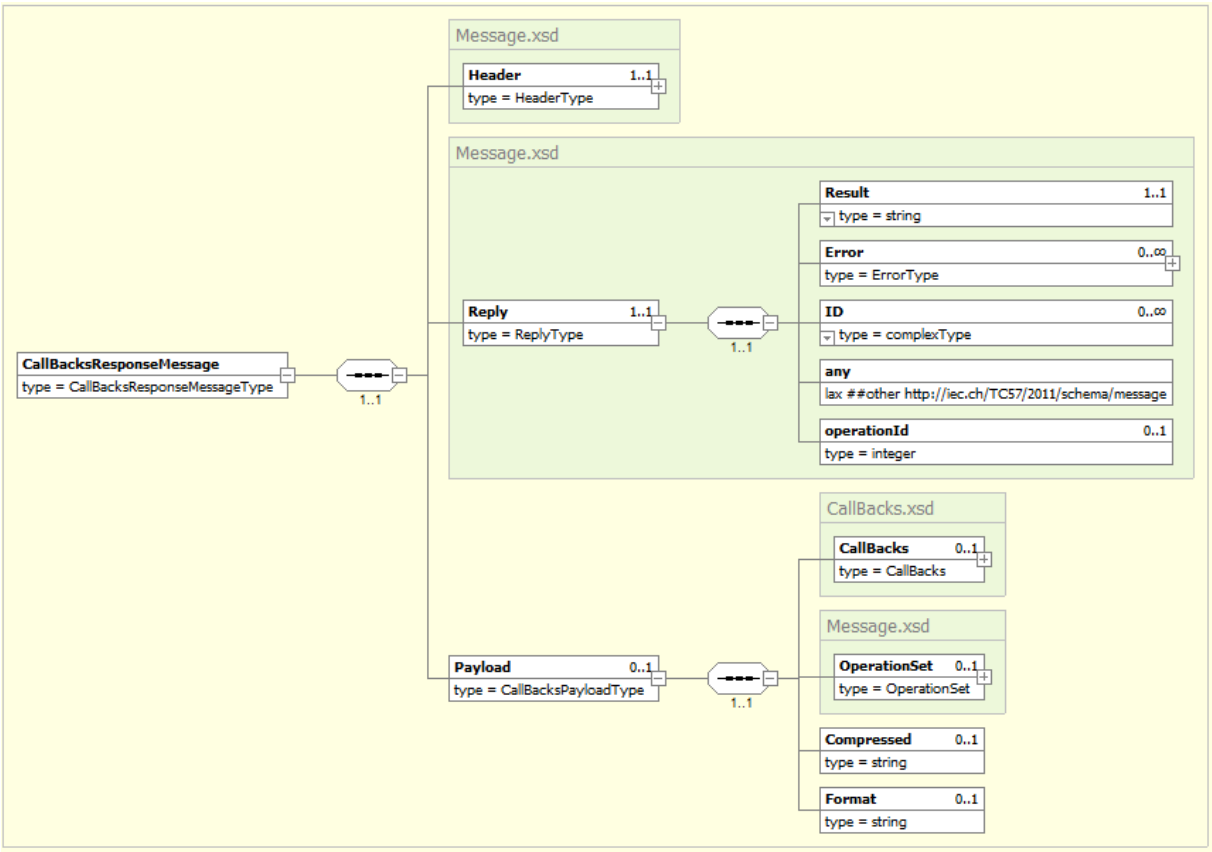

Figure 10.17 – The CallBacksResponse message

The response message contains the CIM defined payload in form of the *CallBacks.xsd* schema which represents the CIM Profile for callbacks.

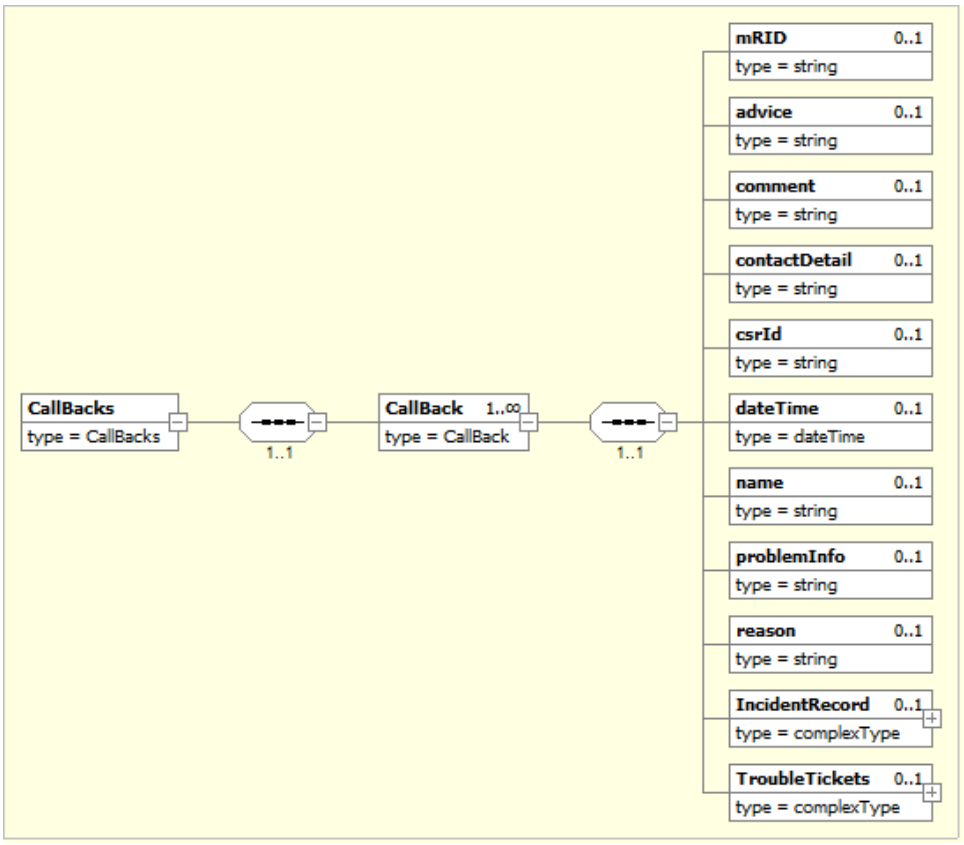

Figure 10.18 – CallBacks.xsd

As shown in Figure 10.18, the *CallBack* object contains the basic information about the incident and trouble ticket. Those objects are depicted in Figure 10.8 and Figure 10.19.

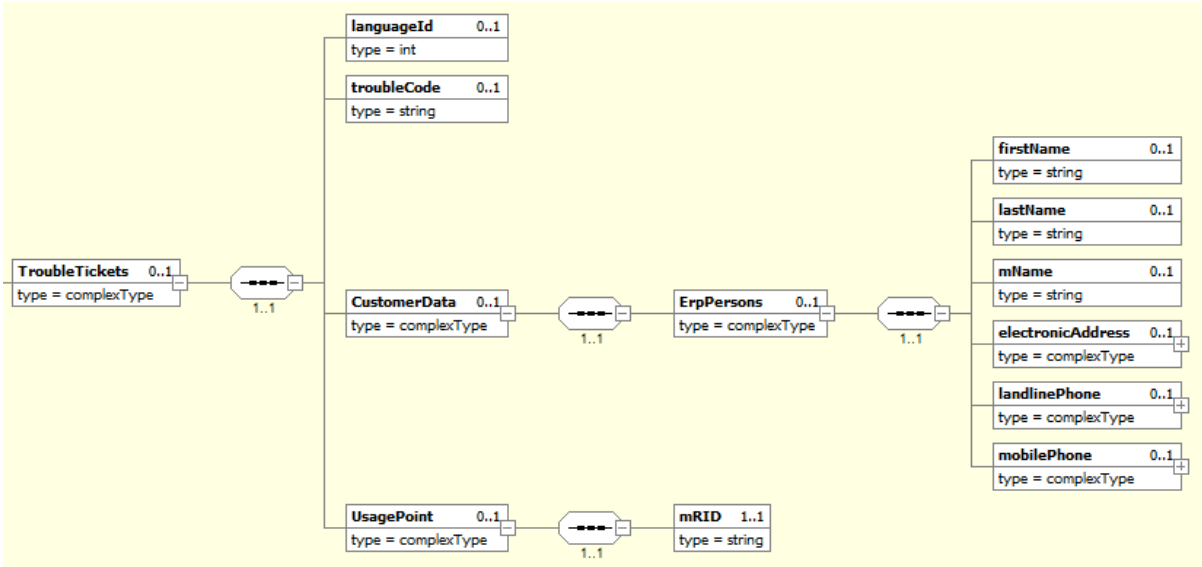

Figure 10.19 – The TroubleTickets object

Table 10.17 defines the mapping between the payload of the *CallBacksResponse.xsd* message and the appropriate entities in the outage model.

Table 10.17 – The CallBacksResponse message → the outage model mapping

CallBacksResponse message			Description	Outage model		
Section	**Property**	**Type**		**Property**	**Type**	**Model Code**
Header	**Verb**	String	Identifier for a specific action to be taken. For this message Verb is reply.	Populated by CRM Adapter	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is CallBacks.	Populated by CRM Adapter	N/A	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by CRM Adapter	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by CRM Adapter	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message Source can be: CallCenter, IVR, Portal, etc.	Populated by CRM Adapter	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by CRM Adapter	N/A	N/A
Header	**CorrelationID**	String	Same as message ID.	Populated by CRM Adapter	N/A	N/A
Reply	**Result**	String	Returned as part of synchronous response. Valid values are: OK, PARTIAL or FAILED.	N/A	N/A	N/A
Payload	mRID	String	Unique identifier of the callback. Generated by EcoStruxure GridOps	CustomID	String	OMS_IMSOBJ_UID
Payload	advice	String	Advice already given to the customer during this callback. Not used by EcoStruxure GridOps.	N/A	N/A	N/A
Payload	comment	String	Comments by customer or CSR during this callback	Comment	String	OMS_CALLBACK_COMMENT

CallBacksResponse message			Description	Outage model		
Section	**Property**	**Type**		**Property**	**Type**	**Model Code**
Payload	contactDetail	String	Additional contact details that are not provided for ErpPerson with ErpTelephoneNumber.	N/A	N/A	N/A
Payload	csrId	String	Customer Service Representative or external system that assigned the callback to himself/itself	AssigendUser	String	OMS_CALLBACK_ASSIGNED_USER
Payload	dateTime	DateTime	Date and time when callback was assigned	AssignedTime	DateTime	OMS_CALLBACK_ASSIGNED_TIME
Payload	name	String	Optional name of the callback. Not used by EcoStruxure GridOps.	N/A	N/A	N/A
Payload	problemInfo	String	Additional information about the problem that occurred	N/A	N/A	N/A
Payload	Reason	String	Reason why callback was created	FeedbackReasonName	String	OMS_TROUBLE_FEEDBACK_FEEDBACKREASON
Payload	IncidentRecord	IncidentRecord	Detailed information is given in Table 10.5	Populated by CRM Adapter	N/A	N/A
Payload	TroubleTickets.CustomerData	ErpPerson	Detailed Information is given in Table 10.2. It is important to note that more the 1 contact type per person can exist (i.e. two email addresses). In that case, due to profile definition, first contact value for that specific type is mapped. This rule is overridden only by existence of a preferred contact types. When Callback has multiple persons defined for contact information, the person who has a preferred contact is returned. Only one preferred caller contact can exist per callback.	Populated by CRM Adapter	N/A	OMS_CALLBACK_CALLER_CONTACT_REF
Payload	TroubeTickets.languageId	Integer	Language ID for the caller	LanguageID	Long	OMS_CALLBACK_LANGUAGE_ID
Payload	TroubeTickets.troubleCode	String	Determines the type of trouble ticket. Some of the values: No Power/No Light, Flick Light/Partial Light, Power Restored, Not Restored, Voltage Problem	EventReason	Long	OMS_EVENT_REASON_NAME

CallBacksResponse message			Description	Outage model		
Section	**Property**	**Type**		**Property**	**Type**	**Model Code**
Payload	TroubeTickets. UsagePoint. mRID	String	Custom ID of the SDP that is originator of a trouble ticket	SdpCustomID	String	OMS_TROUBLE_EVENT_SDP_CUSTOM_ID

10.5.3. Fault

The *CallBacksFault* message is depicted in Figure 10.20.

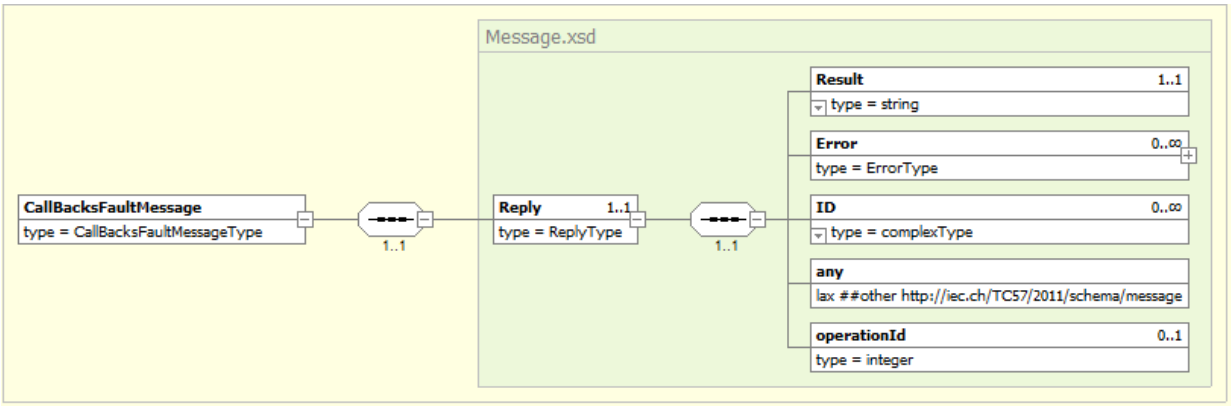

Figure 10.20 – The CallBacksFault message

10.6. CreatedCallBacksResults Operation Messages

The operation definition:

CreatedCallBacksResultsResponse CreatedCallBacksResults*(CreatedCallBacksResultsEvent)*

10.6.1. Request

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

- Header
- Payload

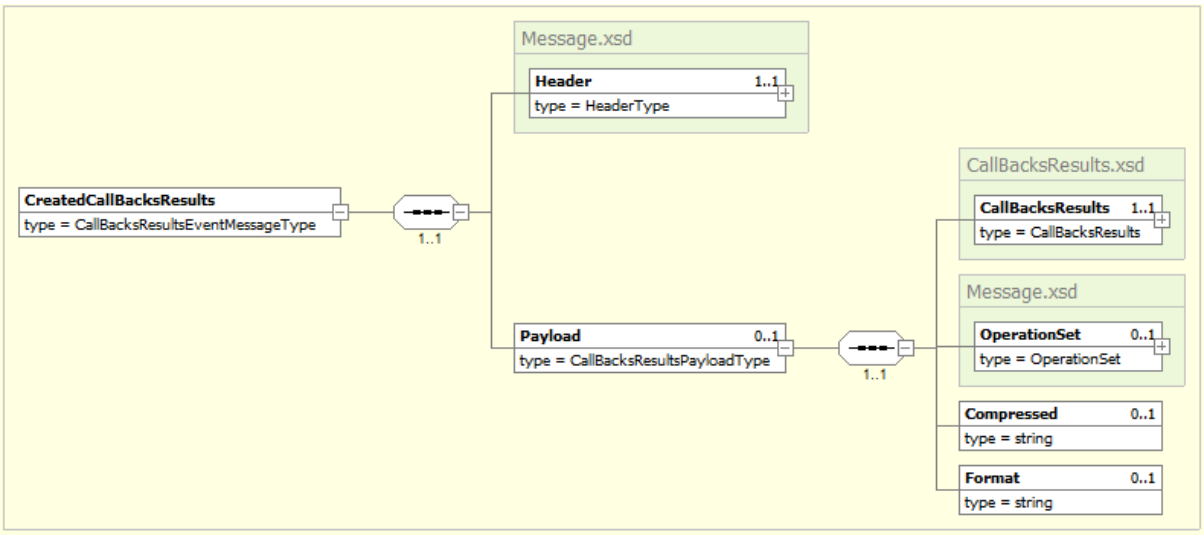

Figure 10.21 – The CreatedCallBacksResultsEvent message

The Payload section carries the CIM defined payload (*CallBacksResults.xsd*) for update of the callback's status. The visual representation of the *CallBacksResults.xsd* schema is given in Figure 10.22.

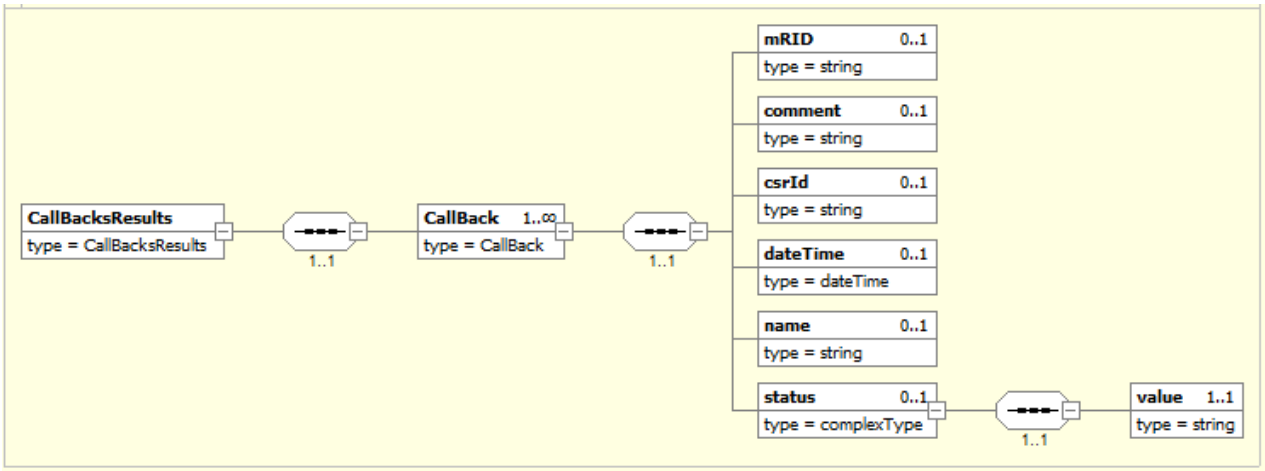

Figure 10.22 – CallBacksResults.xsd

Table 10.18 defines the mapping between the payload of the *CreatedCallBacksResults* event message and the appropriate entities in the outage model.

Table 10.18 – The CreatedCallBacksResultsm message → the outage model mapping

CreatedCallBacksResults message			Description	Outage model		
Section	**Property**	**Type**		**Property**	**Type**	**Model Code**
Header	**Verb**	String	Identifier for a specific action to be taken. For this message Verb is created.	Populated by external system	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is CallBacksResults.	Populated by external system	N/A	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by external system	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by external system	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message Source can be: CallCenter, IVR, Portal, etc.	Populated by external system	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by external system	N/A	N/A
Header	**CorrelationID**	String	Same as message ID.	Populated by external system	N/A	N/A
Payload	mRID	String	Unique identifier of the callback. Generated by EcoStruxure GridOps.	CustomID	String	OMS_IMSOBJ_UID
Payload	comment	String	Comments by customer or CSR during this callback	Comment	String	OMS_CALLBACK_COMMENT
Payload	csrId	String	Customer Service Representative that performed the callback. This attribute is used for validation, not to mapping to any model code.	AssigendUser LastUpdateUser	String	OMS_CALLBACK_ASSIGNED_USER OMS_CALLBACK_LAST_UPDATE_USER
Payload	dateTime	DateTime	Date and time when callback was performed	AssignedTime	DateTime	OMS_CALLBACK_LAST_UPDATE_TIME

CreatedCallBacksResults message			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Payload	name	String	Optional name of the callback. Not used by EcoStruxure GridOps.	N/A	N/A	N/A
Payload	status. **value**	String	Callback status/result. Examples: Restored, Not Restored, No Answer, Busy, etc.	CallbackResultRef	Long	OMS_FEEDBACK_RESULT_NAME

10.6.2. Response

After callbacks results are applied, the response is returned in form of the *CallBacksResults* response message. The unique identifier of the callback along with its status is returned within the response message.

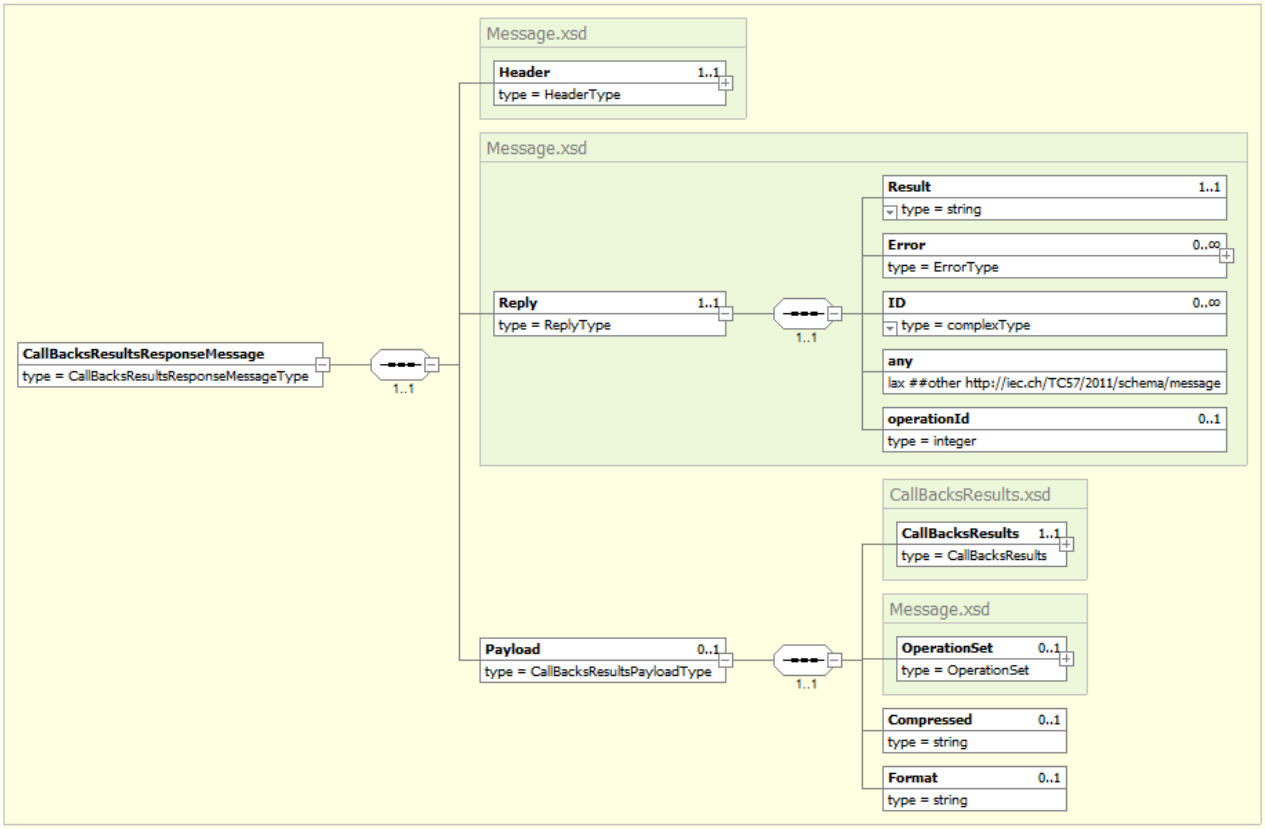

Figure 10.23 – The CallBacksResultsResponse message

Table 10.19 defines the mapping between the payload of the *CreatedCallBacksResults* response message and the appropriate entities in the outage model.

Table 10.19 – The CallBacksResultsResponse message → the outage model mapping

CallBacksResultsResponse message			Description	Outage model		
Section	**Property**	**Type**		**Property**	**Type**	**Model Code**
Header	**Verb**	String	Identifier for a specific action to be taken. For this message Verb is reply.	Populated by CRM Adapter	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is CallBacksResults.	Populated by CRM Adapter	N/A	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by CRM Adapter	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by CRM Adapter	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message Source is EcoStruxure GridOps.	Populated by CRM Adapter	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by CRM Adapter	N/A	N/A
Header	**CorrelationID**	String	Same as correlation ID from request message.	Populated by CRM Adapter	N/A	N/A
Reply	**Result**	String	Returned as part of synchronous response. Valid values are: OK, PARTIAL or FAILED.	N/A	N/A	N/A
Payload	mRID	String	Unique identifier of the callback. Generated by EcoStruxure GridOps.	CustomID	String	OMS_IMSOBJ_UID
Payload	status. **value**	String	Result of the callback update status.	Populated by CRM Adapter	N/A	N/A

10.6.3. Fault

The *CallBacksResultsFault* message is depicted in Figure 10.24.

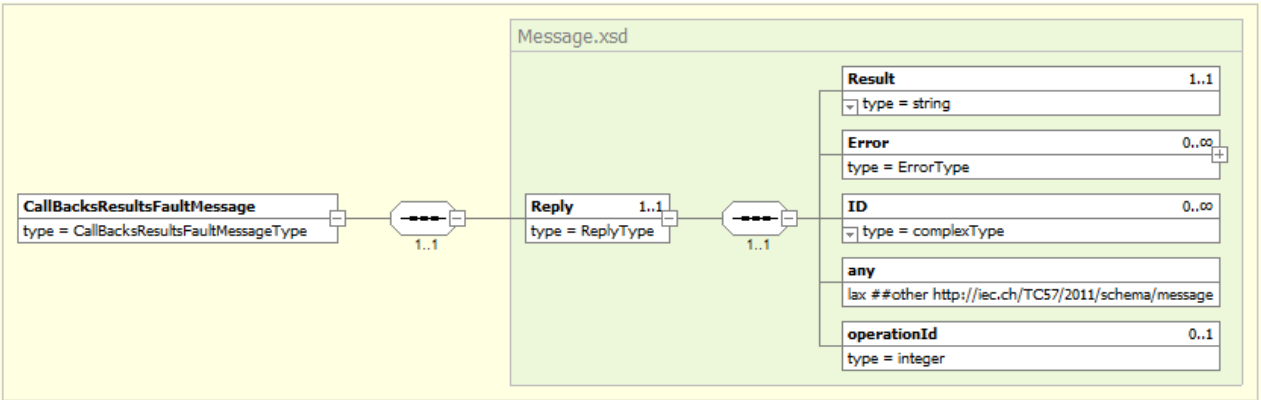

Figure 10.24 – The CallBacksResultsFault message

10.7. CreatedCallBacks Operation Messages

The operation definition:

CreatedCallBacksResponse CreatedCallBacks*(CreatedCallBacksEvent)*

10.7.1. Request

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

- Header
- Payload

Figure 10.25 depicts the event message sent from the EcoStruxure GridOps in case when the callbacks are created.

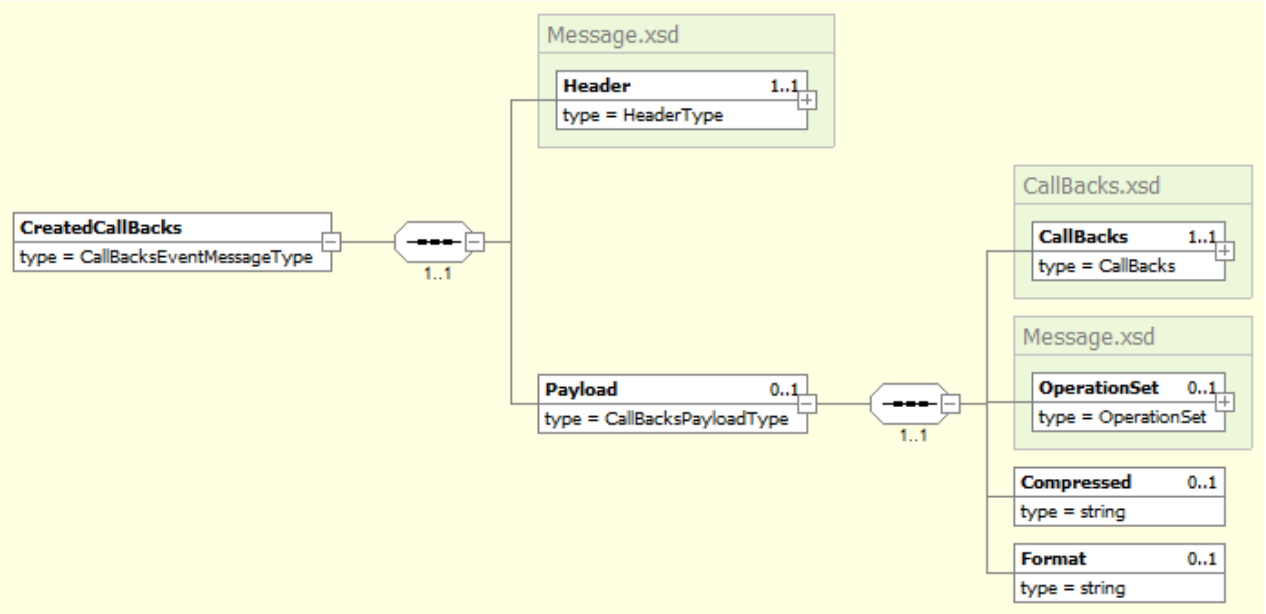

Figure 10.25 – The CreatedCallBacks event message

Both request and response message contains the CIM defined payload in form of the *CallBacks.xsd* schema which represents the CIM Profile for callbacks. The visual representation of the aforementioned schema is given in Figure 10.18.

Table 10.20 defines the mapping between the payload of *CreatedCallBacks event* message and the appropriate entities in the outage model:

Table 10.20 – The CreatedCallBacks message → the outage model mapping

CreatedCallBacks message			Description	Outage model		
Section	**Property**	**Type**		**Property**	**Type**	**Model Code**
Header	**Verb**	String	Identifier for a specific action to be taken. For this message Verb is created.	Populated by CRM Adapter	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is CallBacks.	Populated by CRM Adapter	N/A	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by CRM Adapter	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by CRM Adapter	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message Source is EcoStruxure GridOps.	Populated by CRM Adapter	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by CRM Adapter	N/A	N/A
Header	**CorrelationID**	String	Same as message ID.	Populated by CRM Adapter	N/A	N/A
Payload	mRID	String	Unique identifier of the callback. Generated by EcoStruxure GridOps	CustomID	String	OMS_IMSOBJ_UID
Payload	advice	String	Advice already given to the customer during this callback. Not used by EcoStruxure GridOps.	N/A	N/A	N/A
Payload	comment	String	Comments by customer or CSR during this callback	Comment	String	OMS_CALLBACK_COMMENT
Payload	contactDetail	String	Additional contact details that are not provided for ErpPerson with ErpTelephoneNumber.	N/A	N/A	N/A
Payload	csrId	String	Customer Service Representative or external system that assigned the callback to himself/itself	AssigendUser	String	OMS_CALLBACK_ASSIGNED_USER

CreatedCallBacks message			Description	Outage model		
Section	Property	Type		Property	Type	Model Code
Payload	dateTime	DateTime	Date and time when callback was assigned	AssignedTime	DateTime	OMS_CALLBACK_ASSIGNED_TIME
Payload	name	String	Optional name of the callback. Not used by EcoStruxure GridOps.	N/A	N/A	N/A
Payload	problemInfo	String	Additional information about the problem that occurred	N/A	N/A	N/A
Payload	Reason	String	Reason why callback was created	FeedbackReasonName	String	OMS_TROUBLE_FEEDBACK_FEEDBACKREASON
Payload	IncidentRecord	IncidentRecord	Detailed information is given in Table 10.5	Populated by CRM Adapter	N/A	N/A
Payload	TroubleTickets.CustomerData	ErpPerson	Detailed Information is given in Table 10.2. It is important to note that more the 1 contact type per person can exist (i.e. two email addresses). In that case, due to profile definition, first contact value for that specific type is mapped. This rule is overridden only by existence of a preferred contact types. When Callback has multiple persons defined for contact information, the person who has a preferred contact is returned. Only one preferred caller contact can exist per callback.	TroubleTicketContactRef	Long	OMS_CALLBACK_CALLER_CONTACT_REF
Payload	TroubeTickets.languageId	Integer	Language ID for the caller	LanguageID	Long	OMS_CALLBACK_LANGUAGE_ID
Payload	TroubeTickets.troubleCode	String	Determines the type of trouble ticket. Some of the values: No Power/No Light, Flick Light/Partial Light, Power Restored, Not Restored, Voltage Problem	EventReason	Long	OMS_EVENT_REASON_NAME
Payload	TroubeTickets.UsagePoint.mRID	String	Custom ID of the SDP that is originator of a trouble ticket	SdpCustomID	String	OMS_TROUBLE_EVENT_SDP_CUSTOM_ID

10.7.2. Response

The *CallBacksResponseMessage* needs to have the Header and Reply sections populated while the Payload section does not need to be populated. The response message sent from the external system to the CRM Adapter is depicted in Figure 10.26.

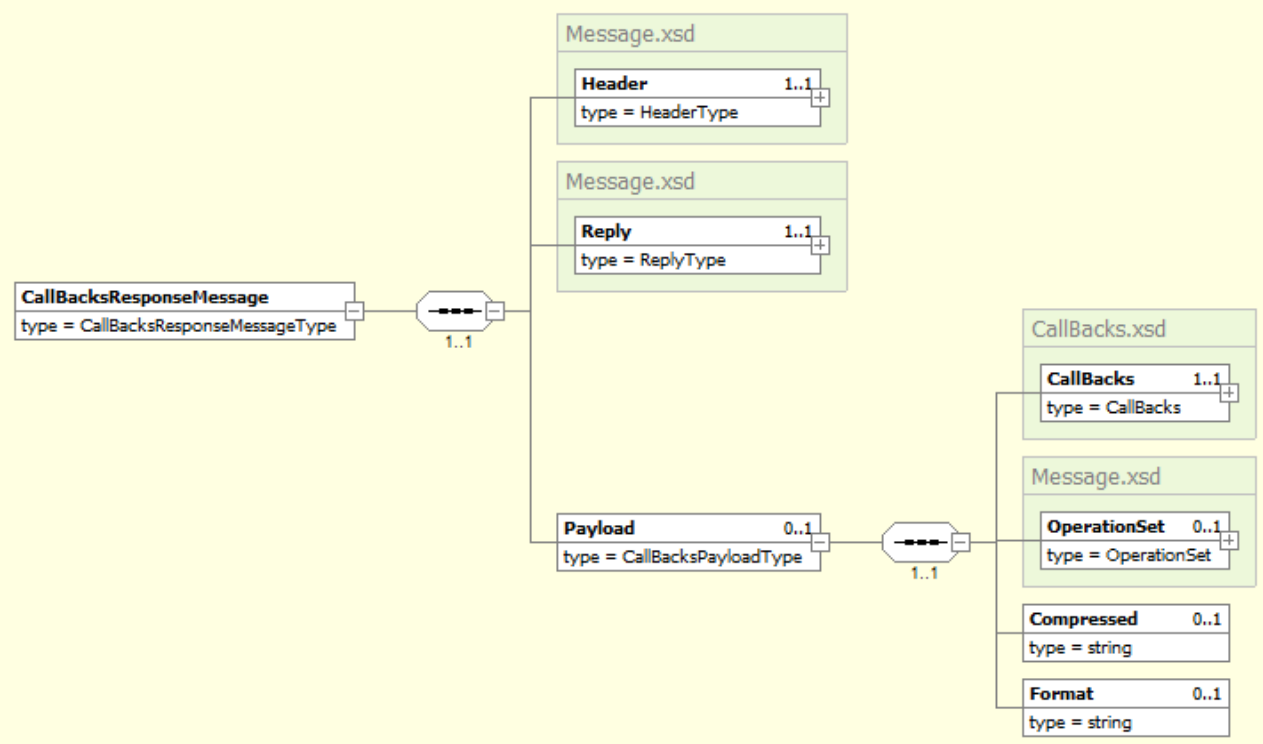

Figure 10.26 – The CallBacksResponse message

Table 10.21 defines the mapping between the *CallBacksResponse* message and the appropriate entities in the outage model.

Table 10.21 – The CallBacksResponse message → the outage model mapping

CreatedCallBacks message			Description	Outage model		
Section	**Property**	**Type**		**Property**	**Type**	**Model Code**
Header	**Verb**	String	Identifier for a specific action to be taken. For this message Verb is reply.	Populated by external system	N/A	N/A
Header	**Noun**	String	Identifier for the subject of the action and/or the type of the payload. For this message Noun is CallBacks.	Populated by external system	N/A	N/A
Header	Revision	String	Revision of CIM standard used. Default value is 2.0.	Populated by external system	N/A	N/A
Header	**Timestamp**	DateTime	Timestamp when message was produced. Example: 2015-12-31T12:34:56+02:00	Populated by external system	N/A	N/A
Header	Source	String	Source system or application that sends the message. For this message Source can be: CallCenter, IVR, Portal, etc.	Populated by external system	N/A	N/A
Header	**MessageID**	String	Unique message ID to be used for tracking messages.	Populated by external system	N/A	N/A
Header	**CorrelationID**	String	Same as correlation ID from request message.	Populated by external system	N/A	N/A
Reply	**Result**	String	Returned as part of synchronous response. Valid values are: OK, PARTIAL or FAILED. If PARTIAL or FAILED, CRM Adapter will write error to log file	N/A	N/A	N/A

10.7.3. Fault

The *CallBacksFault* message is depicted in Figure 10.20.

11. DEPLOYMENT SPECIFICATION

It is thoroughly described in the *EcoStruxure GridOps Management Suite 3.10 Enterprise Integration Platform - Functional Specification* document [2].

The deployment specification is provided in the following table:

Table 11.1 – The deployment specification

Deployment Specification	
Application	CrmAdapter
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

12. INTERFACE CONFIGURATION

CRM 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 CRM adapter. Initially, following configuration files are used the adapter:

Table 12.1 – The configuration files specification

Name of the config file	Configuration File Description
AdapterCrm	Registry configuration xml file
CrmAdapter_ChangeCallbacksResults_ErrorConfiguration	Error configuration xml file for ReceiveCallBacksResult interface
CrmAdapter_ChangeTroubleTickets_ErrorConfiguration	Error configuration xml file for ReceiveTroubleTickets interface
CrmAdapter_CreateTroubleTickets_ErrorConfiguration	Error configuration xml file for ReceiveTroubleTickets interface
CrmAdapter_GetCallbacks_ErrorConfiguration	Error configuration xml file for GetCallBacks interface
CrmAdapter_GetTroubleTickets_ErrorConfiguration	Error configuration xml file for GetTroubleTickets interface
AdapterCrm_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* [2].

Detailed content of above-mentioned configuration files is provided within the *Configuration* folder in the *EcoStruxure GridOps Management Suite 3.10 Advanced Metering Infrastructure Interface.zip* file [3].

13. PERFOMANCE

13.1. Performance Best Practices

In order to achieve better performances during trouble call creation through the CRM Interface, following guidelines should be followed:

- Customer based calls are processed faster than landbase calls.
- Group as many calls within a single request message on the source system side.
- Use multiple (concurrent) web service clients on the source system side.

14. APPENDIX

14.1. WSDL

The WSDL file, XSD schemas and sample messages defined according to the IEC 61968-100 for all CRM web services are provided within the *Web Service Definitions* folder in the *EcoStruxure GridOps Management Suite 3.10 Customer Relationship Management Interface.zip* file [3].

14.2. Message Examples

Message examples for several use cases are provided within the *Message Examples* folder in the *EcoStruxure GridOps Management Suite 3.10 Customer Relationship Management Interface.zip* file [3].

15. RELEASE NOTES

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

15.1. Software Version 3.8.0

Feature	Description
Extended Data Filtering	End-user capability was expanded when pulling trouble call data. Users are now able to obtain both active and archived trouble call data, per ID or SDP ID, in one operation call.
Advanced Data Update	CRM users now have an ability to insert and update multiple caller contact information through CRM Interface.

15.2. Software Version 3.8 SP1

Feature	Description
Introduction of External System ID	End-user capability was expanded when trouble calls are inserted and pulled to/from ADMS. Users are now able to specify the trouble call ID from the external system (where trouble call was initially created).
Customer Status Indication	CRM users now have an ability receive an indication whether the customer is energized or deenergized when he/she reports new trouble call.
Automatic Callback Forwarding support	EcoStruxure ADMS users can now transfer callbacks to automatic mode, based on which CRM adapter pulls them and forwards them to the IVR system.
Trouble call coordinates population	During trouble call insertion, if coordinates are specified along with customer SDP ID, CRM adapter will populate the coordinates as well, next to the SDP ID.
Special Caller Indication	Support for a special caller indication (police/fire department) is added during trouble call reporting.
Query/Notification interfaces - Multiple Caller Contacts	Support for multiple caller contacts implemented for trouble tickets and callbacks interfaces in use cases where adapter exports customer data together with contact information. In situations where there exist multiple caller contacts for a specific contact type (email, landline, mobile), preferred contacts is used (or first if preferred is not stated).

16. DEFINITIONS AND ABBREVIATIONS

Definition/Abbreviation	Description
ADMS	Advanced Distribution Management System (to be provided by Schneider Electric).
CC	Call Center
CIM	Common Information Model
CSR	Customer Service Representative
CRM	Customer Relationship Management
CTA	Call Taking Application
DMD	Dynamic Mimic Diagram
DMZ	Demilitarized Zone
ERS	External Reporting System
ESB	Enterprise Service Bus
FC	Field Client
IVR	Interactive Voice Response
OMS	Outage Management System
SDP	Service Delivery Point
SOAP	Simple Object Access Protocol
WCF	Windows Communication Foundation
WS	Web Service
XML	Extensible Markup Language
XSD	XML Schema Definition