GridOps Management Suite 3.10

Internal External Notifications Interface

Functional Specification

Document Version: 1.0

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1. REFERENCES

#	Title	Description
1.	EcoStruxure GridOps Management Suite 3.10 Enterprise Integration Platform - Functional Specification	The document represents a set of common integration principles applied to all baseline integration adapters.
2.	EcoStruxure GridOps Management Suite 3.10 Email and SMS Interface - Functional Specification	The document describes an out-of-the-box integration adapter designed for forwarding the notification messages from the EcoStruxure GridOps to the end users.
3.	EcoStruxure GridOps Management Suite 3.10 Internal External Notifications Interface	EcoStruxure GridOps Management Suite 3.10 Internal External Notifications Interface zip file contains essential configuration information.

2. 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, EcoStruxure Grid Operation and EcoStruxure Energy Transmission 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.

Internal/External notifications interface provides a uniform approach for defining notification triggers for specific events, currently encompassing Outage and Restoration events. These triggers can be configured for internal utility notifications, crew texting, as well as critical customer service representatives' notifications. All individual notification types have configurable message templates, dynamic list of subscribers and custom filtering criteria that varies for each subscription. Internal/External notifications interface offers an exchange of information between utility personnel and customers in a secure and efficient manner.

Scope of this integration interface includes:

- User Interface – Enables managing notification subscribers, custom notification templates, notification gateway configuration.
- Integration Databases – Storage of notification subscriptions and gateway configuration.
- Adapter component – Translating defined notification triggers to outgoing notification messages.

User Interface is an easily accessible control of DMD application in demilitarized (DMZ) zone. Adapter interface and Integration databases are located in the DMZ.

The centerpiece of this integration interface is the adapter component since the main feature is the notification itself. The number of triggers defined as well as filtering regulations enables notifying the interested parties in specific moments when the information carries the most value for them, whether they are crew personnel, utility personnel, or critical customers. Biggest value of this interface is that after the initial configuration process, all notifications are automatic. No additional effort is needed for notifying critical parties about events of interest.

2.1. General Architecture

Described in the *EcoStruxure GridOps Management Suite 3.10 Enterprise Integration Platform - Functional Specification* [1].

3. OVERVIEW

Internal/External Notification Integration is implemented through following components:

- IEN Adapter component – Implements service subscribers for monitoring the state of incidents. Follows the defined triggers and filters which are defined in the integration database in order to determine whether the notification should be sent. Adapts the behavior of a SMTP client in order to provide automatic notifications to subscribed parties which are defined in the integration database.
- Notifications Configurator user interfaces – Manages all active subscriptions and notification message templates. All configuration changes are stored in the integration database.
- Subscriptions Database – Stores the information about gateway configuration (SMTP server), notification message templates and all active subscriptions per notification event type. Integration Database is deployed on the Historian server in DMZ system.
- Employee Database – Stores the information about utility employees and employee groups which are eligible for outage notification subscriptions.
- Customer Database – Stores the information about customer service representatives which are eligible for outage notification subscriptions.

The following chapters provide more details regarding briefly described interface above, along with the service operation, error handling scenarios, etc.

The use case diagram that represents common participants (actors) and users in the Internal/External Notification process is given in Figure 3.1.

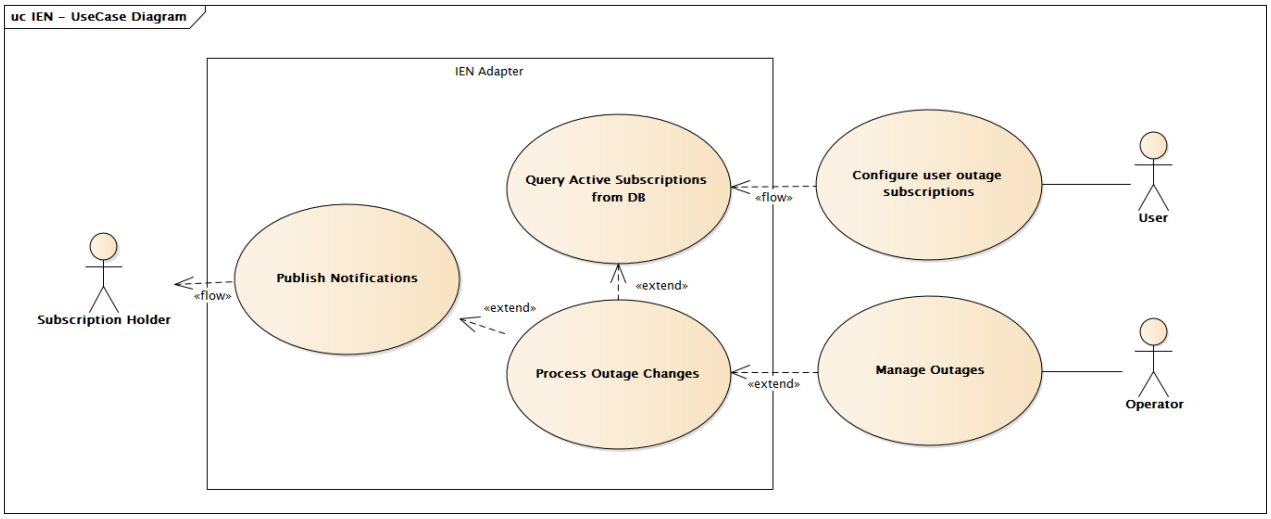

Figure 3.1 – IEN Integration use case diagram

4. FUNCTIONALITY

4.1. Notification Configuration Tool

As aforementioned, UI configuration tool is designed to manage custom event notifications. Currently, it supports outage related events. It is a submodule of Dynamic Mimic Diagram application (DMD). By default, Notifications Configuration Tool module is accessible from *DMD → Tools (dropdown menu) → Internal External Notifications → Notification Configuration*. Besides the default access route, Notification Configuration tool can be located via DMD Quick Find feature as shown in the Figure 4.1.

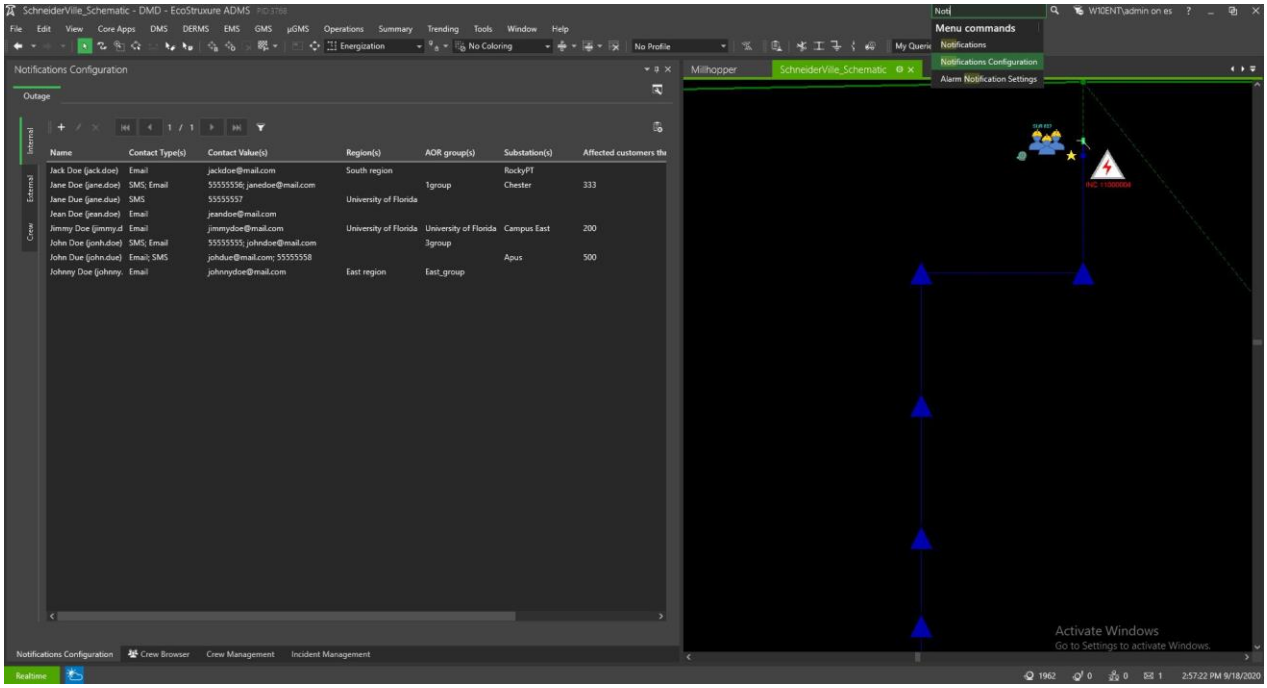

Figure 4.1 – Notification Configuration tool

Besides the main feature of managing event notifications, additional user interfaces are developed in order to complement the notification configuration tool feature. All of these UI controls are locatable under *DMD → Tools (dropdown menu) → Internal External Notifications* and are consisted of following:

- Employee Management Browser – Defined for employee user management, employee user group definitions.
- CSR Management Browser – Defined for Customer Service Representative user management.
- Server Configuration – Defined for managing (storing) SMTP server configuration parameters.

Figure 4.2 depicts the IEN configuration tool operation sequences.

NOTE: Employee and CSR management browser required authorized users. Only users with assigned “Users Administrator” authority can perform actions in these browsers.

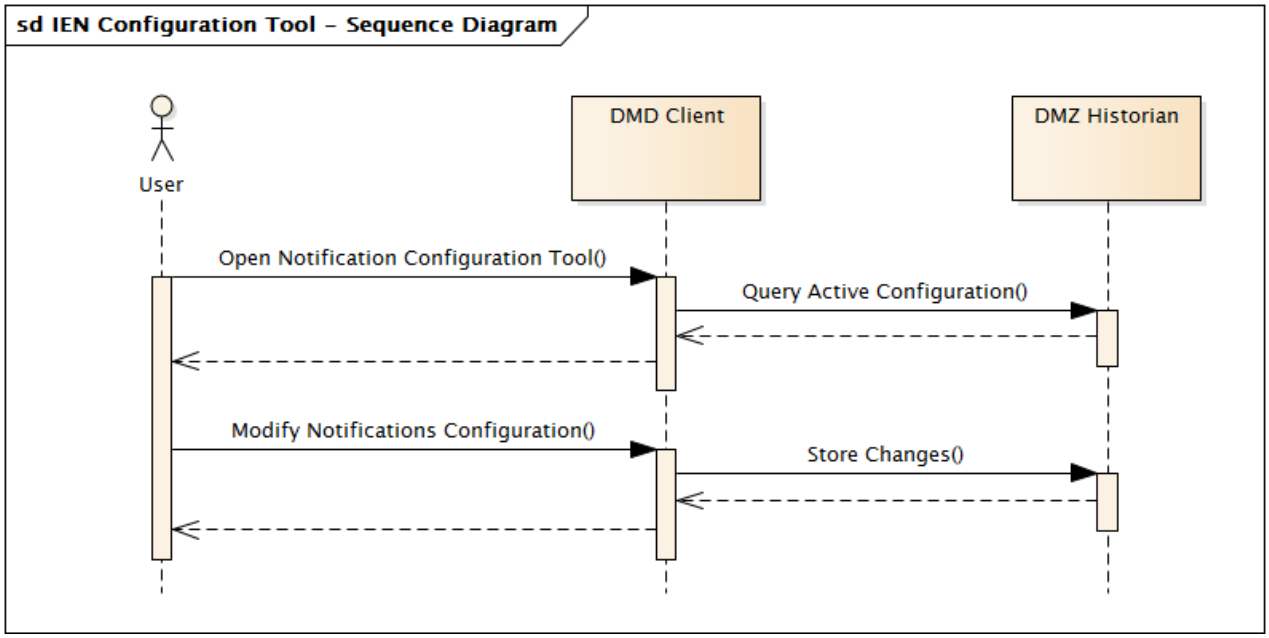

Figure 4.2 – IEN Configuration tool sequence diagram

The process visible on the Figure 4.11 is executed in the following operation schedule:

1. User locates and opens the Notification Configuration Tool in the DMD Application
2. The configuration tools query the currently active subscriptions data from the IEN DB and initializes itself.
3. User analyzes the current notification configuration active subscriptions. He makes modification to an existing subscription or adds a new one.
4. Data is stored in the IEN Database and the data grids containing active subscriptions are refreshed.

4.1.1. Events Configuration

Custom event notifications represent the main feature of this integration interface. EcoStruxure GridOps provides support for internal and external notifications, as well as crew texting. On the Main window of Notification Configuration tool, Under the Outage Notifications panel, three separate subpanels are defined: Internal, External, Crew; shown on Figure 4.1. In further text, these sub features will be named subscription types. Each of these subscription types are managed separately. Desired notifications messages can be delivered via email or SMS.

Each of these subscription types offer following features:

- Custom message template – Each of the subpanels contains a dedicated button for configuring the notification message template. Clicking on this button opens a Template Editor form, dedicated for storing and manipulating notification message templates. Email and SMS notification message templates can be stored withing this form. Since Email Notifications are formatted as HTML, a visual representation of the message template is provided. Upon clicking the Preview action button, template is rendered in the right section of the Template editor. Visual representation of the Template Editor is shown on Figure 4.3.

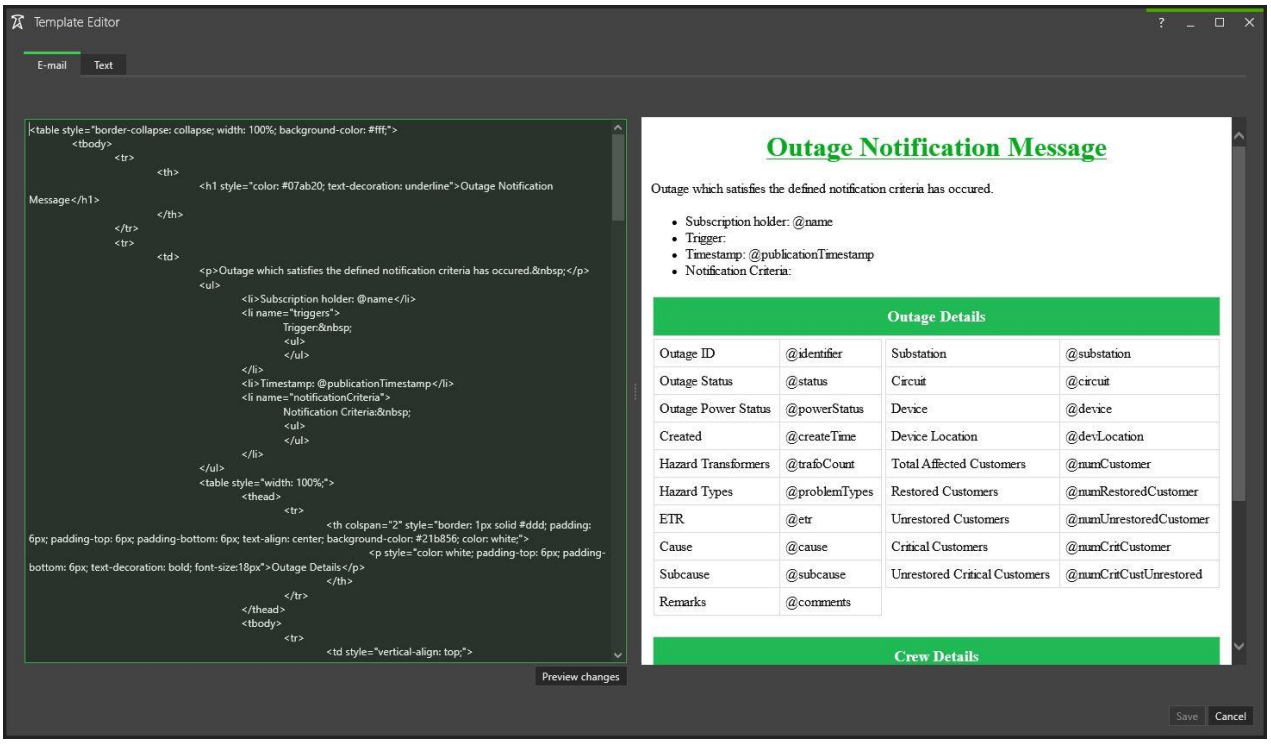

Figure 4.3 – Template Editor Form

- Active event subscriptions – each of the subpanels contains a data grid which contains list of all currently active event subscriptions for that event notification type (internal, external, crew texting). Data grid contains following column values:
  - Person of interest – Person, for whom the notification subscription is defined.
  - Contact type – Email, SMS or both.
  - Contact values.
  - Notification filters – AOR, Region, Substation, Customer count.
- Subscription CRUD operations – Dedicated action buttons for adding new event subscriptions, editing and deleting existing active event subscriptions. Invoking add or edit action buttons load a dedicated form for configuring specific event subscriptions. Visual representation and description are located in 4.1.1.1.
- Active event subscriptions filtering – Dedicated filtering control which enables the filtering of active subscriptions data grid based on column values.

4.1.1.1. Subscription Details

The button for adding a new subscription, or editing existing active subscription, is located on each of the aforementioned subpanels. Invoking the button action loads a Subscription Details form as shown on Figure 4.4. This form is consisted from three segments: Contact information, event triggers and filters:

- Contact information – searchable dropdown list item which contains all eligible subscribers for event notification subscriptions. Besides the user selection, the notification channel can be selected which is consisted of: email, SMS or both.
- Event Triggers – Contains a list of actions of interest which can be enabled and used as event trigger. If any of these triggers occur, Notification processing component will be notified that a potential

notification should be processed and delivered via selected communication channel. Following actions are support in the baseline solution:

- Outage Confirmation – new incident is created.
- ETA update – estimated time of arrival for the assigned crew is modified.
- Outage confirmation – incident is confirmed by the crew on field.
- Crew assigned – crew is assigned to an incident.
- Crew on site – crew has arrived at the incident's location.
- Cause update – incident cause is updated.
- Affected Customers Count – total number affected customers by the incident is modified.
- Unrestored Customers Count – number of unrestored customers by the incident is modified.
- Outage restored – incident is restored (Incident status has Field Complete semantic).
- ETR update – estimated time of restoration is modified.

- Event Filters – Defines filtering criteria which determines whether the triggered event should be processed. Following notification filters are supported in the baseline solution:
  - Region
  - Area of Responsibility
  - Substation
  - Customer count threshold
  - Percentage of restoration threshold
  - Availability timeframe – Time period in which the subscription holder does not want to be notified.

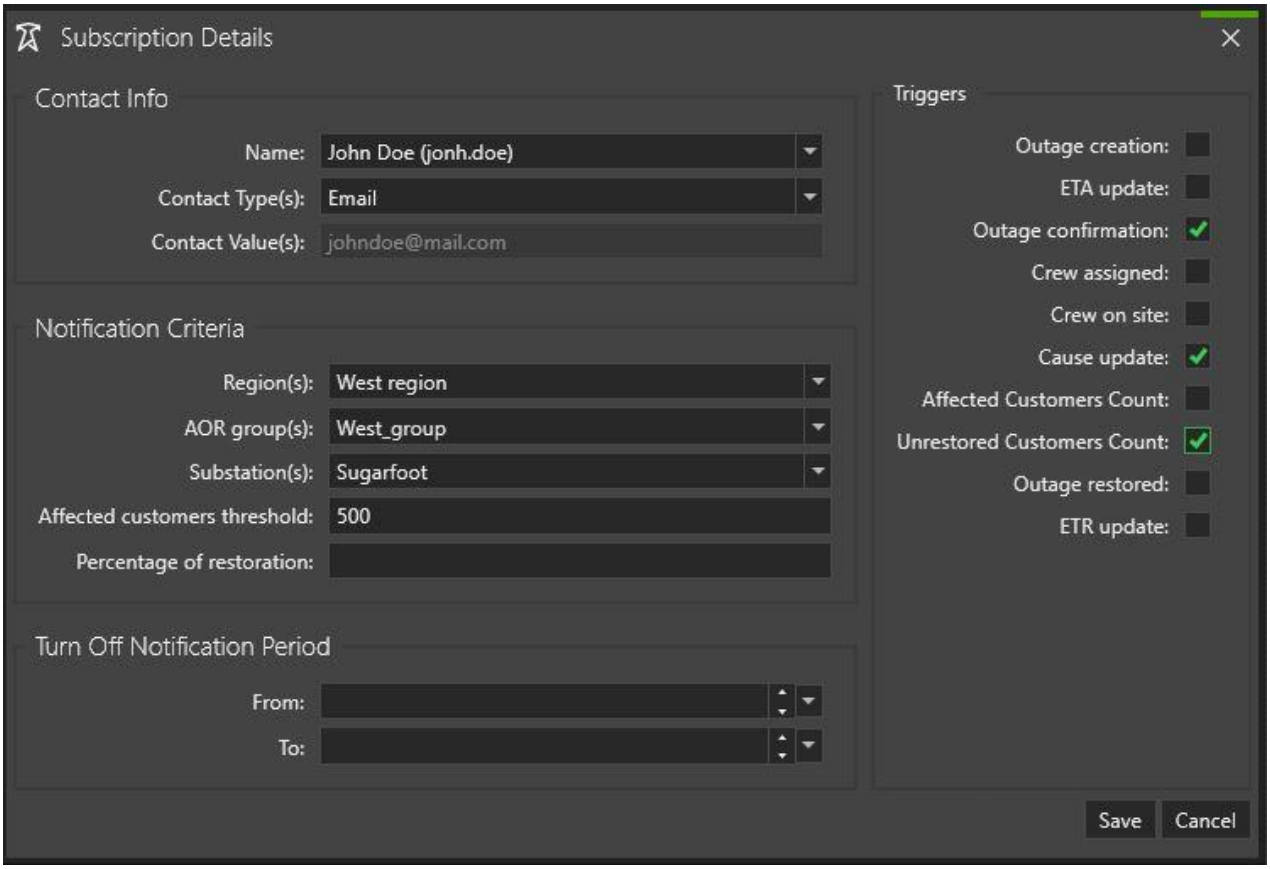

Figure 4.4 – Subscription Details Form

4.1.1.2. Internal Notifications

As aforementioned, these notifications are designed for utility personnel. Internal notifications panel does not differ visually from customer and crew texting panels. It contains all of shared features with following deviations:

- Active subscriptions data grid – Contains only active subscriptions for internal notifications.
- Add new subscription – User has the option of choosing whether he wants to create a group, or a individual employee subscription.
- Add/Edit subscription form – Contacts dropdown list item, for defining the notification recipient has a dedicated user storage for internal notifications (Employee Database).

4.1.1.3. External Notifications

External notifications are designed for registered customer service representatives. External notifications panel does not differ visually from internal and crew texting panels. It contains all of shared features with following deviations:

- Active subscriptions data grid – Contains only active subscriptions for CSR notifications.
- Add/Edit subscription form – Contacts dropdown list item, for defining the notification recipient has a dedicated user storage for customer notifications (Customer Database).

4.1.1.4. Crew Text Notifications

Crew texting notifications are defined for lead crew members. Crew texting panel does not differ visually from internal and crew texting panels. It contains all of shared features with following deviations:

- Active subscriptions data grid – Contains only active subscriptions for crew texting.
- Add/Edit subscription form – Contacts dropdown list item, for defining the notification recipient has a dedicated user storage for crew notifications (Crew Management Service in memory database).
- Message Templates form – contains only the SMS template option. Email notifications are not supported for crews.

4.1.2. Employee Users Management

Employee users management is performed within a dedicated UI form – Employee Management Browser. Main feature of this form is the data grid containing the list of currently active employee users as well as active employee user groups. The data grid contains all of the features as active subscriptions data grid. Visual representation is represented on Figure 4.5.

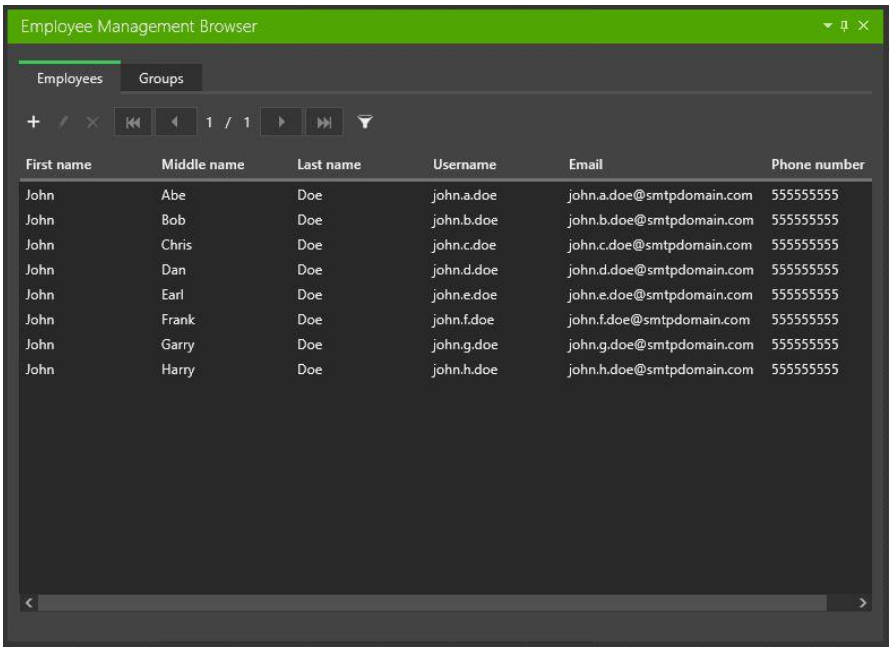

Figure 4.5 – Employee Management Browser

4.1.2.1. Managing Employee Users & Groups

Above the data grid, basic CRUD operations are located. User can define new Employee, edit details of an existing, remove non active Employee user. Upon invoking the Create option, or Update option for an existing Employee, Employee Details form is loaded. Employee Details form is visible on Figure 4.6. Employee users and user groups data is stored in the Employee database on the Historical Server. This data is replicated across all systems.

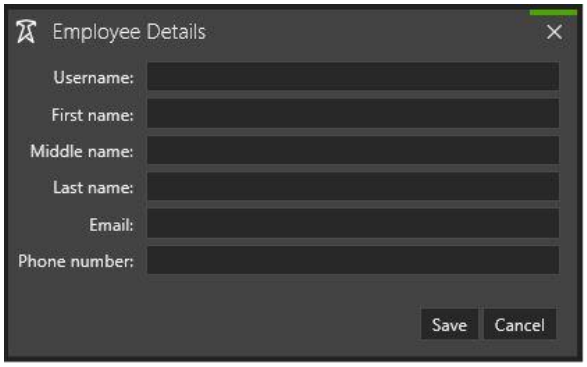

Figure 4.6 – Employee Details

Employee user groups are managed similarly, in the groups tab view of the Employee Management Browser. Same CRUD operations exist above the groups data grid. Upon invoking the Create option, or Update option for an existing Group, Group Details form is loaded. Employee Group Details form is visible on Figure 4.7. User can enter or modify basic group details, associate it to employees.

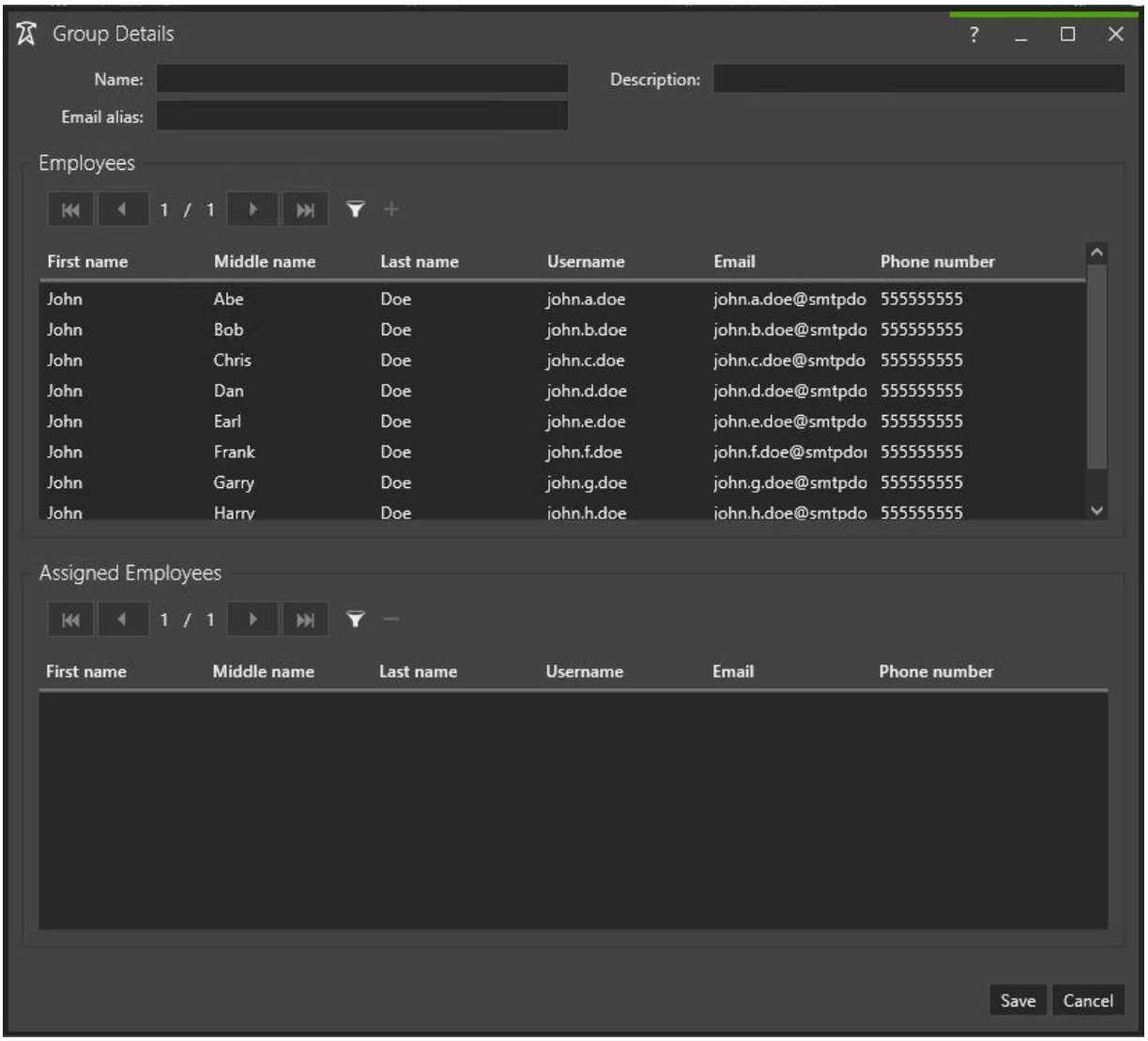

Figure 4.7 – Employee Group Details

4.1.3. CSR Users Management

CSR users management is performed within a dedicated UI form - CSR Management Browser. Main feature of the form is a data grid containing the list of currently active Customer Service Representatives. The data grid contains all of the features as active subscriptions data grid. Visual representation is on Figure 4.8.

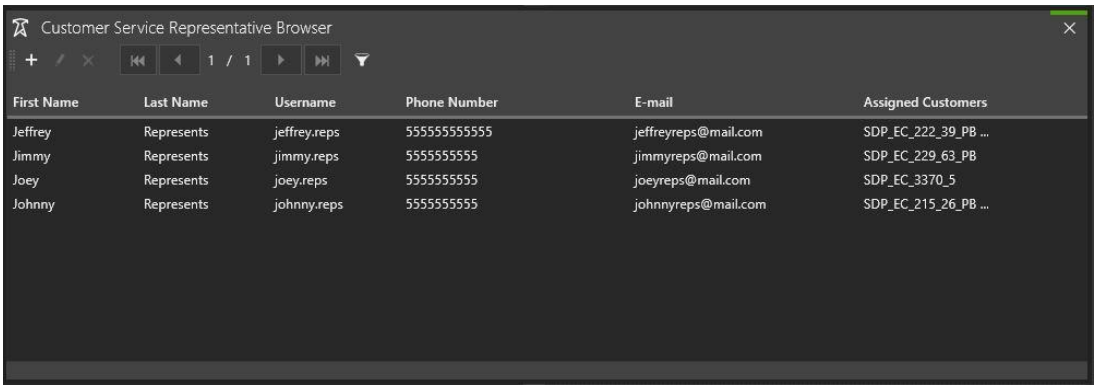

Figure 4.8 – CSR Browser

4.1.3.1. Managing CSR Users

Above the data grid, basic CRUD operations are located. User can define new CSR, edit details of an existing, remove non active CSRs. Upon invoking the Create option, or Update option for an existing CSR, CSR Management form is loaded. CSR Management form is visible on Figure 4.9. User can enter or modify basic CSR contact information, as well as manage the related customers. Customer Service Representatives data is stored in the Customer database on the Historical Server. This data is replicated across all systems.

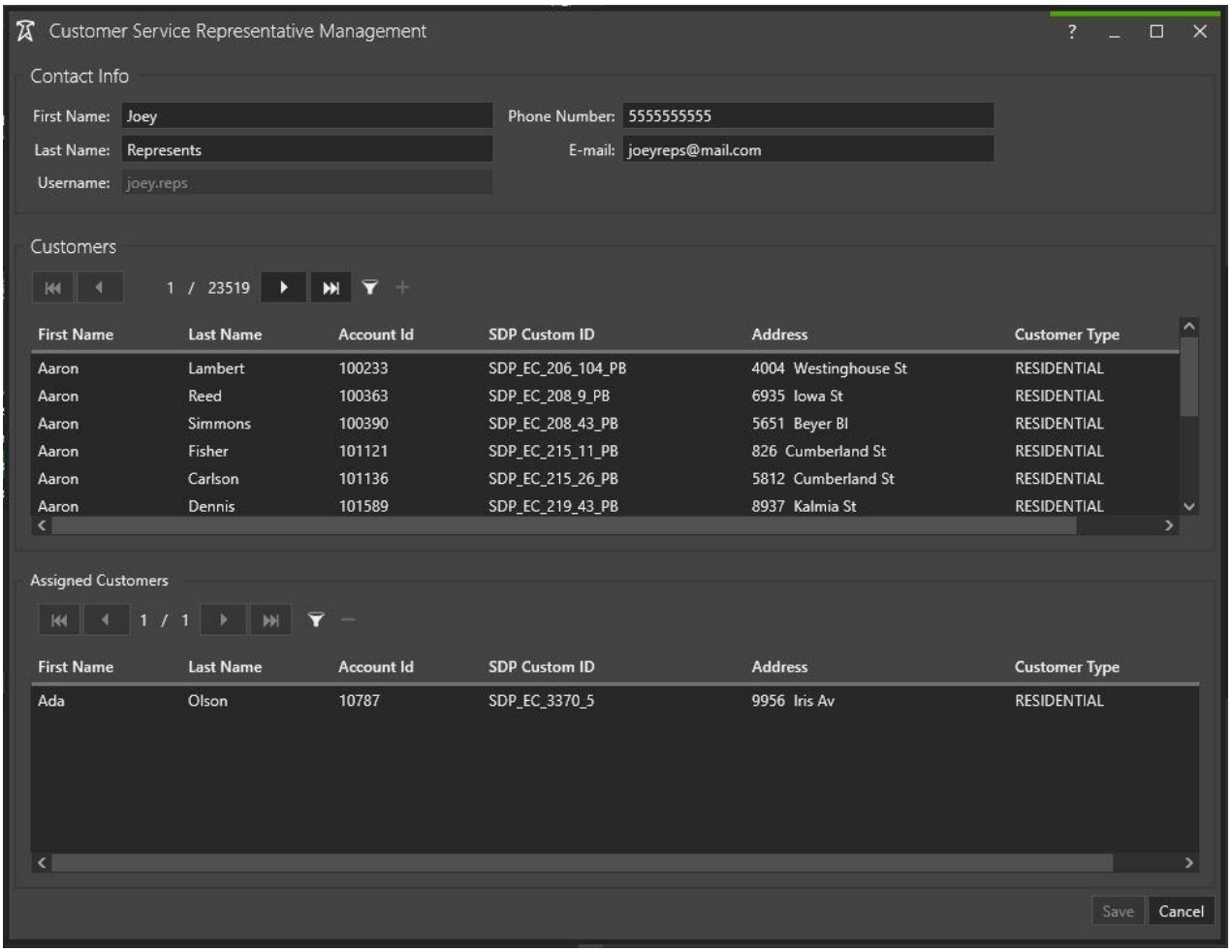

Figure 4.9 – CSR Management form

4.1.4. Gateway Configuration

4.1.4.1. SMTP Server

Notification configuration tool offers a feature for configuring gateway server, primarily the SMTP server connection parameters. This configuration is application wide and applies to all event configuration types. A dedicated button is introduced on the Notification configuration tool main window. Upon clicking it, a small form is loaded for entering the SMTP server connection settings, default sender information. This configuration data is stored locally in the IEN integration database and is accessible from all EcoStruxure GridOps instances (main and backup sites). Figure 4.10 shows visual representation of this feature.

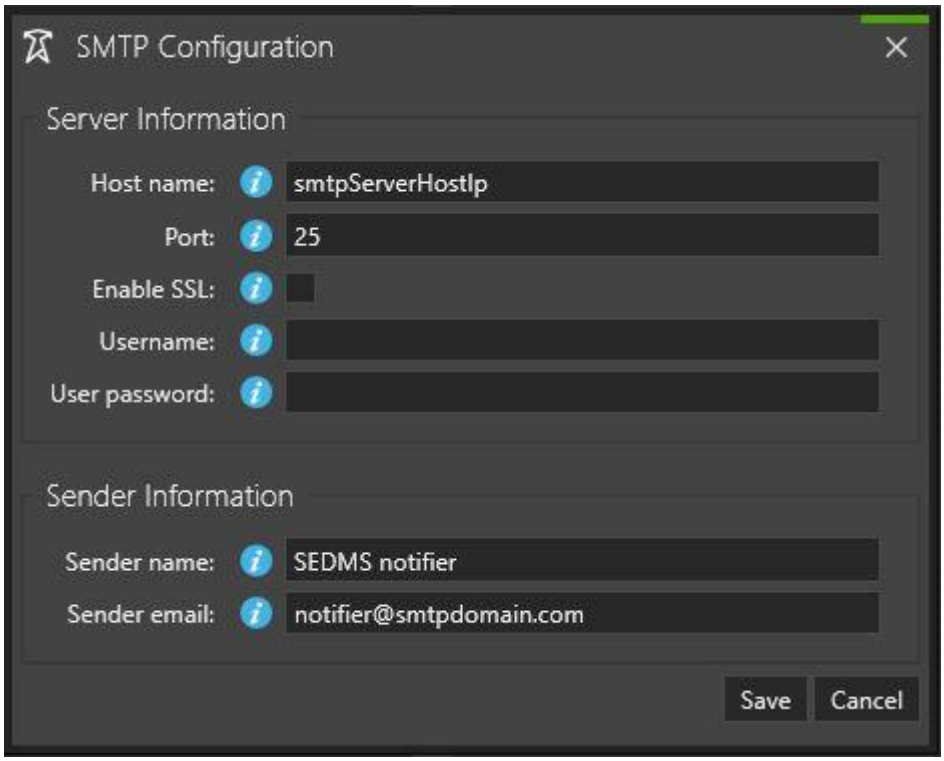

Figure 4.10 – SMTP Configuration form

4.1.4.2. SMS Gateway

SMS gateway configuration is the scope of *EcoStruxure GridOps Management Suite 3.10 Email and SMS Interface - Functional Specification* document [2].

4.1.5. Use Cases

Table 4.1 – IEN Configuration Tool use cases

Use Case	Message Mapping			Action
	Property	Type	Value	
Successful subscription insertion/update	Result	String	OK	User opens the Notification Configuration tool. List of currently active outage event subscriptions are visible. User modifies existing subscriptions, adds new. All subscriptions are successfully stored in the corresponding database. Notification message is visible on the bottom of the panel indicating it.
	Error.code	String	-	
	Error.level	String	-	
	Error.reason	String	-	
	Error.details	String	-	
Successful Configuration update	Result	String	OK	User opens the Notification Configuration tool and modifies existing SMTP configuration or message templates. All changes are successfully stored in the corresponding database. Notification message is visible on the bottom of the panel indicating it.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	

Use Case	Message Mapping			Action
	Property	Type	Value	
Subscription Filtering.	Result	String	OK	User opens the Notification Configuration tool. List of currently active outage event subscriptions are visible, but the list is to large. Above the subscriptions DataGrid a filtering control is visible. User creates a custom filtering rule and applies it. Active subscriptions data set is reduced and shows only those that correspond the filtering rule.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Message Template Editing	Result	String	OK	User opens the Notification Configuration tool. List of currently active outage event subscriptions are visible. Above the subscriptions DataGrid a message template button is visible. Clicking it opens an additional module which enables modifications of message templates. Editing can be done by hand, or using the editing controls displayed in the module. All changes are stored in the IEN database.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Database Connection Issue – Window startup	Result	String	Failed	User tries to open Network Configuration tool and it fails due to unavailability of the IEN database. A popup error window is visible which states what cause the failure. Configuration tool is not opened.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Database Connection Issue – Configuration update	Result	String	Failed	User opens the Network Configuration tool. During the process of managing notification subscriptions, a connection to the IEN database is lost. User tries to store the data to the database, but it fails. An error message is visible in the bottom of the panel indicating the reason of the failure.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Unauthorized user	Result	String	Failed	Unauthorized user tries to open the Employee or CSR management browser. Operation is denied and a popup window with details is shown to the user.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
IEN license missing	Result	String	Failed	Users tries to locate the Notification Configuration Tool in the DMD application, with IEN Feature being licensed. The tool is not accessible. CSR and Employee Management browser, as well as server configuration are still accessible to the authorized users since they are not associated to the IEN license and can be utilized in other business use cases.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	

4.2. IEN Adapter Component

IEN Adapter is a self–hosted services deployed within the OASyS infrastructure. The adapter's responsibility is to utilize the notification configuration stored in the IEN database. It is implemented as an outage subscriber. Each time an outage is created, modifier or removed, IEN adapter is triggered. Once triggered, adapter searches the IEN database in order to find active subscriptions for the said trigger. If adapter determines that the trigger, together with the filtering rules, satisfies an active subscription, a notification message is formed and forwarded to the subscription holder.

The process is shown in detail on the Figure 4.11.

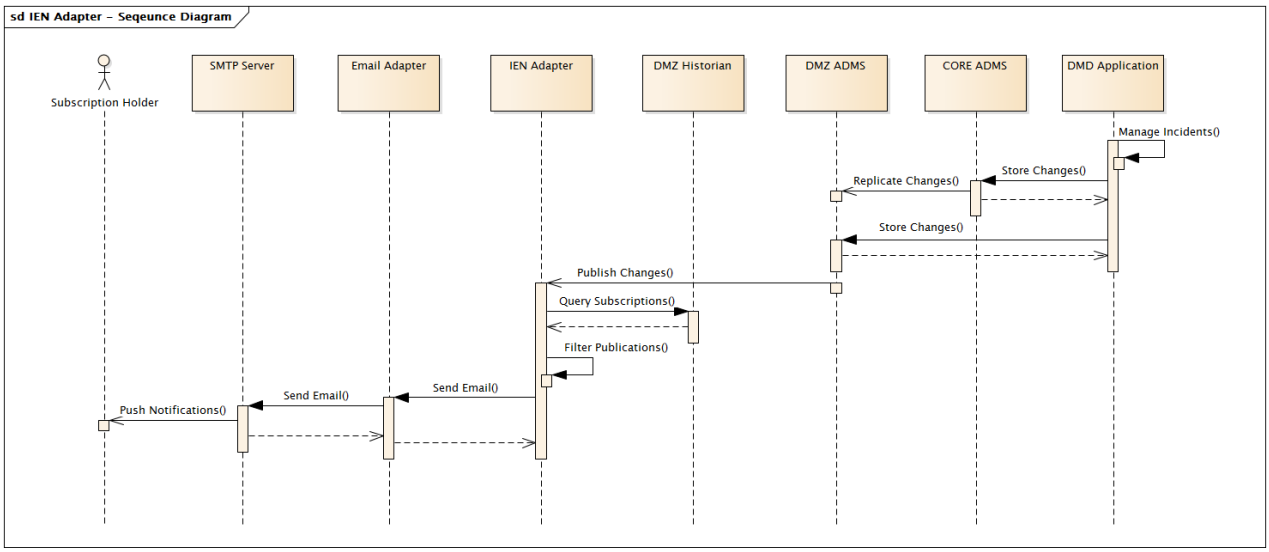

Figure 4.11 – IEN Adapter sequence diagram

The process visible on the Figure 4.11 is executed in the following operation schedule. Note* Active outage subscriptions need to exist in the IEN database:

1. New incident is created (or existing modified) in the DMD application in CORE (or DMZ) system. Data is stored in the corresponding in memory database belonging to the Incident Management Service.
2. Changes are replicated to the DMZ system.
3. IEN adapters outage subscribers are notified about the changes present on the IMS service storage in the DMZ system.
4. Adapter scans the IEN database in order to find active subscriptions for the occurred trigger.
5. Adapter applies the filtering rules to the subscriptions which support the occurred trigger. Filtering rules are defined in #REF.
6. Adapter queries the message templates for the subscriptions that satisfy the filtering criteria and forms the notification messages.
7. Adapter forwards the notification messages to the subscription holders based on the defined communication channels. On the Sequence diagram, that communication channel is SMTP server.

4.2.1. Use Cases

Table 4.2 – IEN Adapter use cases

Use Case	Message Mapping			Action
	Property	Type	Value	
Outage Notification – Existing subscription	Result	String	OK	The operator makes changes to an existing incident in the DMD application. For examples, confirms the outage. Since that change is relevant to the IEN adapter component, a publication is received. Adapter queries the IEN DB in order to find active subscriptions for the defined triggers. Notification message is created and forwarded via selected communication channel.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Outage Notifications – Non existing subscription	Result	String	OK	The operator makes changes to an existing incident in the DMD application. For examples, confirms the outage. Since that change is relevant to the IEN adapter component, a publication is received. Adapter queries the IEN DB in order to find active subscriptions for the defined triggers. Adapter does not find any active subscriptions for the occurred trigger. It logs the information in the dedicated adapter log file.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Outage Notifications – SMTP server unavailable	Result	String	FAILED	The operator makes changes of interest to an existing incident. Active email subscriptions exist for that trigger. However, due to the unavailability of the SMTP server, notification message cannot be forwarded to the subscription holder. Error is written in the adapter log file and a system event is created describing the problem.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Outage Notification – SMS Gateway problem	Result	String	FAILED	The operator makes changes of interest to an existing incident. Active SMS subscriptions exist for that trigger. However, due to the problem with the SMS gateway, notification message cannot be forwarded to the subscription holder. Error is written in the adapter log file and a system event is created describing the problem.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	
Outage Notification – Internal Server error	Result	String	FAILED	The operator makes changes of interest to an existing incident. During the processing of the event, an unexpected error occurs which aborts the notification process. Error is written in the adapter log file and a system event is created describing the problem.
	Error.code	String	N/A	
	Error.level	String	N/A	
	Error.reason	String	N/A	
	Error.details	String	N/A	

5. MESSAGES

Message definition process was highly influenced by the notification's communication medium. Since two are supported, as aforementioned, we differ two type of message definitions for IEN interface.

- Outage Notification Email Message – Most graphical email clients support HTML email, and many default to it. Many of these clients include both a GUI editor for composing HTML emails and a rendering engine for displaying received HTML emails. With that in mind, Outage Notification email message is designed. It carries the information about the subscription, trigger that initiated the process, and detailed outage information. Message template contains static and dynamic data. Dynamic data is represented via keywords that are replaces during processing with real values. Chapters 5.1.1 and 5.1.2 explain in detail the message attributes and show the Outage Notification Email example. Raw HTML message template is attached in the document's appendix.
- Outage Notification SMS Message – Besides email notification, users can opt to subscribe to SMS notifications for the desired outage triggers an criteria. SMS message template is defined to carry a limited set of information due to SMS message length restrictions. In case where the notification message exceeds the 70 characters, it will be split into several SMS message in order to deliver information to the subscriber. Default SMS template should not exceed 2 SMS messages. Chapter 5.2.1 explains in detail the message attributes.

5.1. Outage Notification Email

5.1.1. Data Transformation

Table 5.1 – Outage Notification Message Mapping - General

Outage Notifications Message					
Property	**Keyword**	**Type**	**Description**	**Optional**	**Model Code**
Subscription holder	@name	string	Name of the subscription holder. Differs for internal, customer and texting subprocesses and refers to employee, customer, crew member name, respectively	N	N/A
Trigger	@trigger	string	The name of the trigger which initiated the outage notification process.	N	N/A
Timestamp	@publicationTimestamp	datetime	Trigger timestamp, indicated when the relevant outage related change occurred.	N	N/A
Region	@region	string	Geographical region constraint for the defined subscription. Region constraint is not mandatory and can be omitted when creating a new subscription. It is tightly coupled to AOR and Substation criteria. Only 1 can be selected per subscription.	Y	OMS_INCIDENT_REGION
Area of Responsibility	@area	string	Geographical Area of Responsibility for the defined subscription. AOR constraint is not mandatory and can be omitted when creating a new subscription. It is tightly coupled to Region and Substation criteria. Only 1 can be selected per subscription.	Y	OMS_INCIDENT_AOR_GROUP
Substation	@substation	string	MV substation constraint for the defined subscription. Substation constraint is not mandatory and can be omitted when creating a new subscription. It is tightly coupled to Region and AOR criteria. Only 1 can be selected per subscription.	Y	OMS_INCIDENT_SUBSTATION_NAME
Affected Customers threshold	@custCountThreshold	integer	Customer count threshold criteria. Implies that the outage of interest must exceed the defined threshold for the total affected customers count. This criterion is not mandatory. Omitting it from the subscription signifies that all outages satisfy the customer threshold criteria.	Y	OMS_INCIDENT_CUST_COUNT

Outage Notifications Message					
Property	**Keyword**	**Type**	**Description**	**Optional**	**Model Code**
Outage ID	@identifier	string	Outage identifier.	N	OMS_IMSOBJ_UID
Outage Status	@status	string	Current outage status.	N	OMS_INCIDENT_STATUS_REF – OMS_INCIDENT_STATUS_NAME
Outage Power Status	@powerStatus	string	Current outage power status.	N	OMS_INCIDENT_POWER_STATUS
Created	@createTime	datetime	The outage creation timestamp.	N	OMS_INCIDENT_CREATE_TIME
Hazard Transformers	@trafoCount	integer	The number of transformers affected by the outage	N	?
Hazard Types	@problemTypes	string[]	The collection of existing problems related to the outage, problem types.	N	OMS_INCIDENT_PROBLEM_REFS – OMS_INCIDENT_PROBLEM_TYPE
ETR	@etr	datetime	The estimated restoration time of the outage.	N	OMS_INCIDENT_ESTIMATED_END_TIME
Type	@incidentType	string	Type of the incident	N	OMS_INCIDENT_TYPE_REF OMS_INCIDENT_TYPE_NAME
Subtype	@incidentSubtype	string	Subtype of the incident	N	OMS_INCIDENT_SUBTYPE_REF OMS_INCIDENT_SUBTYPE_NAME
Cause	@cause	string	Current outage selected cause information.	N	OMS_INCIDENT_CAUSEREF – OMS_INCIDENT_CAUSE_NAME
Subcause	@subcause	string	Current outage selected subcause information	N	OMS_INCIDENT_SUBCAUSEREF – OMS_INCIDENT_SUBCAUSE_NAME
Remarks	@comments	string[]	Outage notes/comments	N	OMS_INCIDENT_NOTEREFS – OMS_INCIDENT_NOTE_NOTE
Substation	@substation	string	Outage substation	N	OMS_INCIDENT_SUBSTATION_NAME
Circuit	@circuit	string[]	Outage feeders	N	OMS_INCIDENT_FEEDER_NAME
Affected Feeders	@affectedFeeders	string[]	List of all affected normal feeders	N	OMS_INCIDENT_AFFECTED_FEEDER_NAMES

Outage Notifications Message					
Property	**Keyword**	**Type**	**Description**	**Optional**	**Model Code**
Dynamic Feeders	@dynamicFeeders	string[]	List of all actual affected feeders	N	OMS_INCIDENT_DYNAMIC_FEEDER_NAMES
Device	@device	string	Outage device	N	OMS_INCIDENT_DEVICE_REFS – OMS_DEVICE_NAME
Device type	@devType	string	Outage device type	N	OMS_INCIDENT_DEFICE_REFS – OMS_DEVICE_TYPE
Device Location	@devLocation	String	Outage device location	N	OMS_INCIDENT_DEVICE_REFS – OMS_INCIDENT_DEVICE_LOCATION ??
Total Affected Customers	@numCustomer	int	Total number of currently affected customers related to the outage in question	N	OMS_INCIDENT_NUM_CUSTOMER
Unrestored Customers	@numUnrestoredCustomer	Int	Total number of currently unrestored customers related to the Outage in question.	N	OMS_INCIDENT_UNREST_CUSTOMER?
Restored Customers	@numRestoredCustomer	Int	Number of currently restored customers related to the outage in question. It is calculated by subtracting unrestored customers from total affected customers count	N	N/A
Critical Customers	@numCritCustomer	Int	Total number of critical customers affected by the outage in question	N	OMS_INCIDENT_NUM_CRIT_CUSTOMER
Unrestored Critical Customers	@numCritCustUnrestored	Int	Number of currently unrestored critical customers related to the outage in question	N	OMS_INCIDENT_UNREST_CRIT_CUSTOMER

Table 5.2 – Outage Notification Message Mapping - Crew Details

Outage Notifications Message – Crew Details					
Property	**Keyword**	**Type**	**Description**	**Optional**	**Model Code**
Name	@crewName	string[]	Name of the crew	Y	
Dispatched	@assignedTime	datetime[]	Scheduling timestamp	Y	

Outage Notifications Message – Crew Details					
Property	**Keyword**	**Type**	**Description**	**Optional**	**Model Code**
Onsite	@ata	datetime[]	Actual time of arrival	Y	

Table 5.3 – Outage Notification Message Mapping - Outage Intervals

Outage Notifications Message – Outage Intervals					
Property	**Keyword**	**Type**	**Description**	**Optional**	**Model Code**
Time	@outageTime	datetime[]	Specific time when a set of customers	Y	
Affected	@numTotalCust	int[]	Scheduling timestamp	Y	
Restored	@numRestored	int[]	Estimated time of arrival	Y	
Remaining	@numUnrestored	int[]	Actual time of arrival	Y	

5.1.2. Message Example

Outage Notification Message

- Subscription holder: Vladimir Todorovic (vladimir.todorovic)
- Trigger:
  - Outage restored
- Timestamp: 10/19/2020 11:10:14 AM
- Notification Criteria:

Outage Details			
Outage ID	INC 11000015	Substation	Bristol
Outage Status	Field Completed	Circuit	BR_157
Outage Power Status	Restored	Device	loadbreaker_352187338151
Created	10/19/2020 11:06:25 AM	Device Location	TSM 234
Hazard Transformers	2	Total Affected Customers	234
Hazard Types	N/A	Restored Customers	234
ETR	10/19/2020 12:50:25 PM	Unrestored Customers	0
Cause	None	Critical Customers	0
Subcause	None	Unrestored Critical Customers	0
Remarks	restoration progress		

Crew Details		
Name	Dispatched	Onsite
Line crew 402	10/19/2020 11:06:36 AM	N/A
Line crew 405	10/19/2020 11:06:36 AM	N/A

Outage Intervals			
Time	Affected	Restored	Remaining
10/19/2020 11:10:09 AM	234	234	0
10/19/2020 11:08:56 AM	234	6	228
10/19/2020 11:06:25 AM	234	0	234

Customers Affected			
Name	Account	Address	SDP
Ann Ayala	121381	8428 Balboa Av; Apartment 11; San Diego	SDP_EC_400_11_PB

Figure 5.1 – Outage Notification Message example

5.2. Outage Notification SMS

5.2.1. Mapping Table

Table 5.4 – Outage Notification SMS Message Mapping - General

Outage Notifications Message					
Property	**Keyword**	**Type**	**Description**	**Optional**	**Model Code**
ID	@identifier	string	Outage identifier.	N	OMS_IMSOBJ_UID
STATUS	@status	string	Current status of the outage	N	OMS_INCIDENT_STATUS_REF – OMS_INCIDENT_STATUS_NAME1
POWER	@powerStatus	string	Current power status of the outage	N	OMS_INCIDENT_POWER_STATUS
DEVICE	@device	string	Outage device	N	OMS_INCIDENT_DEVICE_REFS – OMS_INCIDENT_DEVICE_NAME
LOCATION	@devLocation	string	Outage device location	N	OMS_INCIDENT_DEVICE_REFS – OMS_INCIDENT_DEVICE_LOCATION ??
UNRESTORED	@numUnrestoredCustomer	int	Current number of unrestored customers affected by the outage in question	N	OMS_INCIDENT_UNREST_CUSTOMER
CRITICAL	@numCritCustUnrestored	Int	Number of currently unrestored critical customers related to the outage in question	N	OMS_INCIDENT_UNREST_CRIT_CUSTOMER

6. ERROR HANDLING AND REPORTING

6.1. IEN Adapter

Described in the *EcoStruxure GridOps Management Suite 3.10 Enterprise Integration Platform - Functional Specification* [1].

6.2. IEN Configuration Tool

Since the configuration tool is not a standalone process like IEN adapter component, it does not have a dedicated log file. Rather, the potential error use cases are written in the DMD application log file located. As aforementioned, all log files are located at:

C:\SchneiderElectricData\OASyS\Servers\log and have following name format:

DMD_PROCESSID#.log

Example:

DMD_12391.log

When a certain use case fails, the configuration tool stores appropriate entry within the application log. Additionally, some error use cases can result in event creation which are visible in the DMD Event Summary.

7. DEPLOYMENT AND CONFIGURATION

The IEN Adapter component provides integration between the EcoStruxure GridOps and clients external SMTP server in order to provide proactive real-time information to the persons of interest.

The deployment specification is provided in the following table:

Table 7.1 – The deployment specification

Deployment Specification	
Application	AdapterIEN
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

Figure 7.1 depicts standard deployment configuration for all IEN Integration participants.

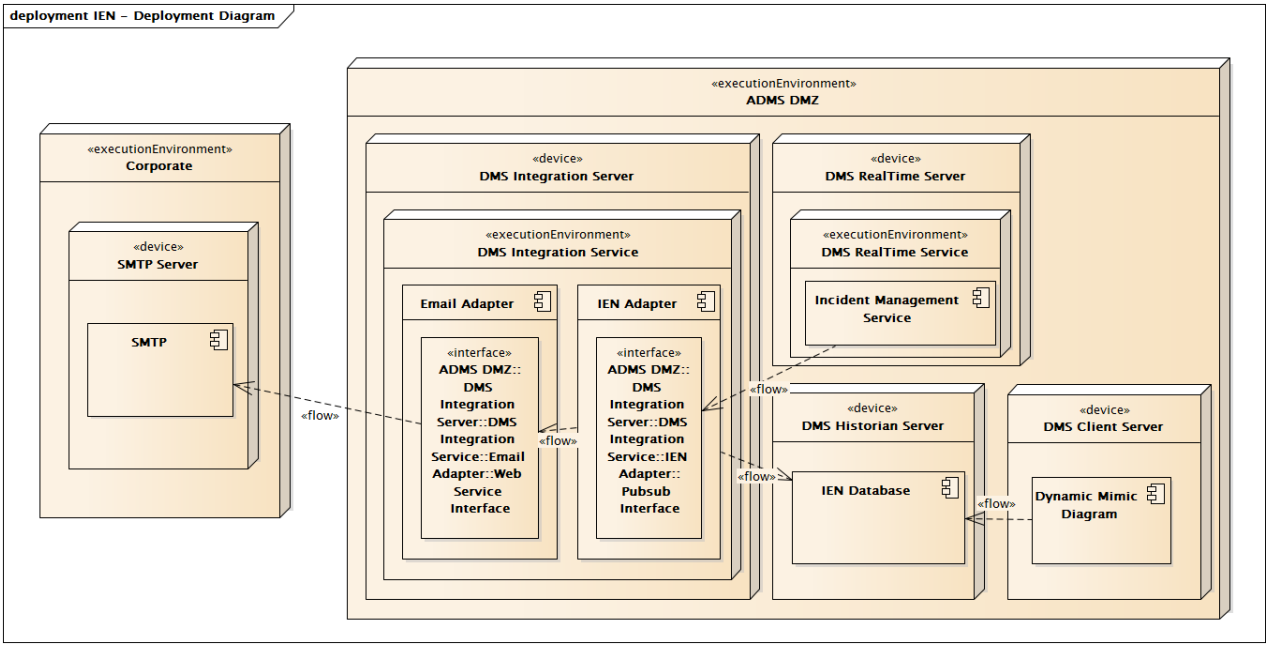

Figure 7.1 - IEN Integration Components - Deployment Diagram

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

Table 7.2 – The configuration files specification

Name of the config file	Configuration File Description
AdapterIEN	Registry configuration xml file

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

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

8. RELEASE NOTES

The following new features related to Product Email Interfaces were introduced in the software, starting from version 3.10.

9. DEFINITIONS AND ABBREVIATIONS

Definition/Abbreviation	Description
ADMS	Advanced Distribution Management System
AOR	Area of Responsibility
CRS	Crew Management Service
CSR	Customer Service Representative
DMD	Dynamic Mimic Diagram
DMZ	Demilitarized Zone
DNS	Domain Name Server
HTML	Hyper Text Markup Language
IEC	International Electrotechnical Commission
IMS	Incident Management Service
GDA	Generic Data Access
GUI	Graphical User Interface
NMC	Network Management Console
SMS	Short Messaging Service
SMTP	Simple Message Transfer Protocol