# EcoStruxure™

# GridOps Management Suite 3.10

## E-mail & SMS Interface

## Functional Specification

Document Version: 1.0

Updated: June, 2024

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# 1. REFERENCES

| # | Title | Description |
|---|-------|-------------|
| 1. | EcoStruxure GridOps Management Suite 3.10 Internal External Notifications Interface - Functional Specification | The document describes an out-of-the-box integration adapter designed for sending the outage-related event notifications to the end users. |
| 2. | EcoStruxure GridOps Management Suite 3.10 SCADA - Functional Specification | This document describes the ExoStruxure GridOps SCADA system which provides real-time communication with the external systems, data processing, all traditional SCADA functionalities such as supervisory control, alarming, tagging, trending, etc. as well as the SCADA configuration and commissioning. |
| 3. | 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. |
| 4. | Tech Datasheet NXS-9750-3G Rev.3 | Technical Datasheet of the EagleSMS device model NXS-9750-3G. Link leads to external site. |
| 5. | EcoStruxure GridOps Management Suite 3.10 Email and SMS Interface | EcoStruxure GridOps Management Suite 3.10 Email and SMS Interface zip file contains essential configuration information. |

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# 2. ASSUMPTIONS AND PREREQUISITES

The Email & SMS Integration is developed under following assumptions:

- Details about architecture, error handling and auditing, security are stated in the *EcoStruxure GridOps Management Suite 3.10 Enterprise Integration Platform Functional Specification* document [3].
- EcoStruxure GridOps has the possibility to send emails for various business logic implementations to external systems via predefined SMTP server or SMS gateway.
- Schneider Electric does not provide SMTP server. SMTP server is in utility's jurisdiction. Email adapter utilizes predefined SMTP server.
- Out of the box address book source is Employee database located on DMZ historical server.
- Data limit is imposed by the corresponding SMTP server which adapter utilizes. EcoStruxure GridOps recognizes that limit and manages email attachments correspondingly.
- Schneider Electric does not provide GSM modem necessary for SMS notifications. SMTP server is in utility's jurisdiction. EcoStruxure GridOps Email adapter utilizes the provided GSM modem.

# 3. INTRODUCTION

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

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

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

Email & SMS interface provides a uniform approach for sending email (SMS) notifications to various recipients, for a variety of use cases. Sending notification messages is available from the high-security environment as well as demilitarized (DMZ) zone, for both domain and remote users. Email & SMS interface allows an exchange of EcoStruxure GridOps-related information between utility personnel in a secure and efficient manner. It supports two types of message exchange patterns, on demand and by exception (event).

On demand email sending is done upon user request through the Email control which is embedded in tabular and document displays in DMD and Web DMD. The Email control is also available during printing and exporting of display contents. Also, sending the email with free-form contents is available from the DMD. Default attachment types available are PDF printout of the display and any file available on the local machine or a shared location. Care must be taken as to the size of the attached document, which is limited by the email server. Upon submitting the request, corresponding service operation is invoked within Email adapter, which propagates the email message over SMTP protocol to the dedicated email server provided by the client.

By exception (on event) interface is designed to handle system (or custom) events. Adapter can implement plugins that are subscribed to data of interest, for which email or SMS need to be sent. Besides custom adapter plugins, by exception message notifications can be generated in dependent DMS/Integration services and forwarded to end users via Email & SMS interface. By Exception event notifications are utilized in *EcoStruxure GridOps Management Suite Internal External Notifications Interface* document [1] and *EcoStruxure GridOps Management Suite 3.10 SCADA - Functional Specification* [2].

Besides sending message notification, Email & SMS interface implements an operation for retrieving address book from a predefined source (or sources). Out-of-the-box address book source is made out of users specified within DMZ systems Historical Server in Employee database.

In case that defined email message formats and predefined set of event-based email notifications implemented in the software out-of-the-box solution are not adequate for specific project solution or a previous release is chosen, a customization would be required. Additionally, any newly identified use-cases should be developed as additional customizations.

*NOTE:*     Different address book sources can be implemented as a custom plugin.

## 3.1.  General Architecture

Described in the *EcoStruxure GridOps Management Suite 3.10 Enterprise Integration Platform - Functional Specification* [3].

# 4. INTERFACE OVERVIEW

Email & SMS Integration is implemented through the Email Adapter component. The aforementioned adapter implements a WCF services for providing support for sending email and SMS notifications from DMD and WebDMD components. Service implements two operations:

- SendEmailNotification service - Used for sending an email notification to predefined set of recipients obtained from the address book or manually entered. The operation encapsulates an additional operation for retrieving address book entries.
    o  GetAddressBook operation is used for polling information about recipients from a predefined address book source. User filtering is possible via operation overloads. Users can be filtered so that they belong to a certain user group, as well as specific user filtering based on common user properties.
- SendSMSNotification service – Used for sending an SMS notification to predefined set of recipients.

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 of the aforementioned interface in the Email & SMS Integration is given in Figure 4.1.
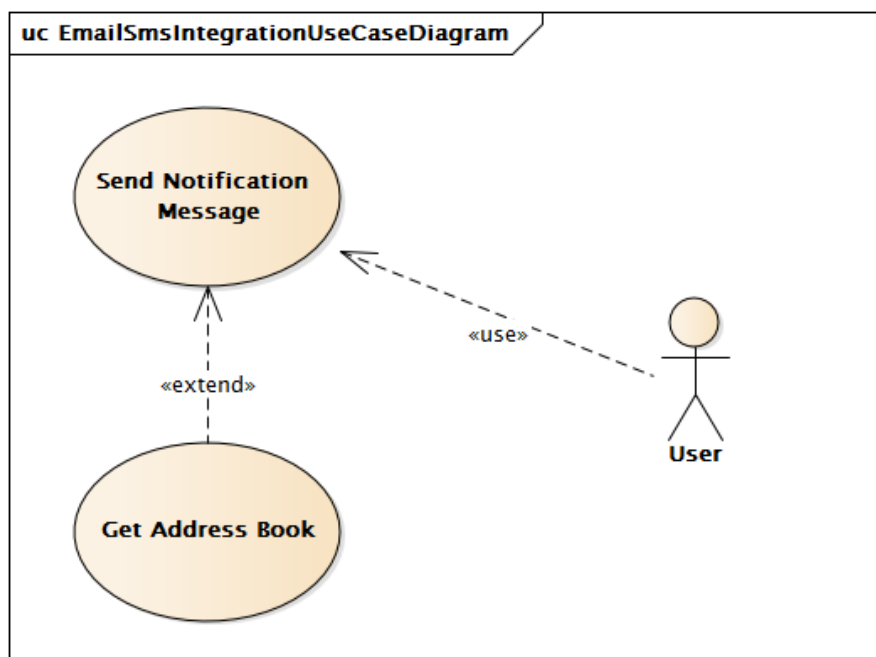


*Figure 4.1 – The Email Integration use case diagram*

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# 5. EMAIL SERVICE

## 5.1. SendEmailNotification Operation

### 5.1.1. Overview

SendEmailNotification service operation encapsulates a functionality of sending email notifications to corresponding recipients. It can be consisted internally of two individual operations. An operation which is designed for retrieving user details (GetAddressBook) as well as a dedicated SendMail operation. Functionality is defined with a common contract, so that it is easily replaceable, based on custom requirements. Incoming request model is translated so that it satisfies outgoing message format.

The high-level sequence diagram is given in Figure 5.1.
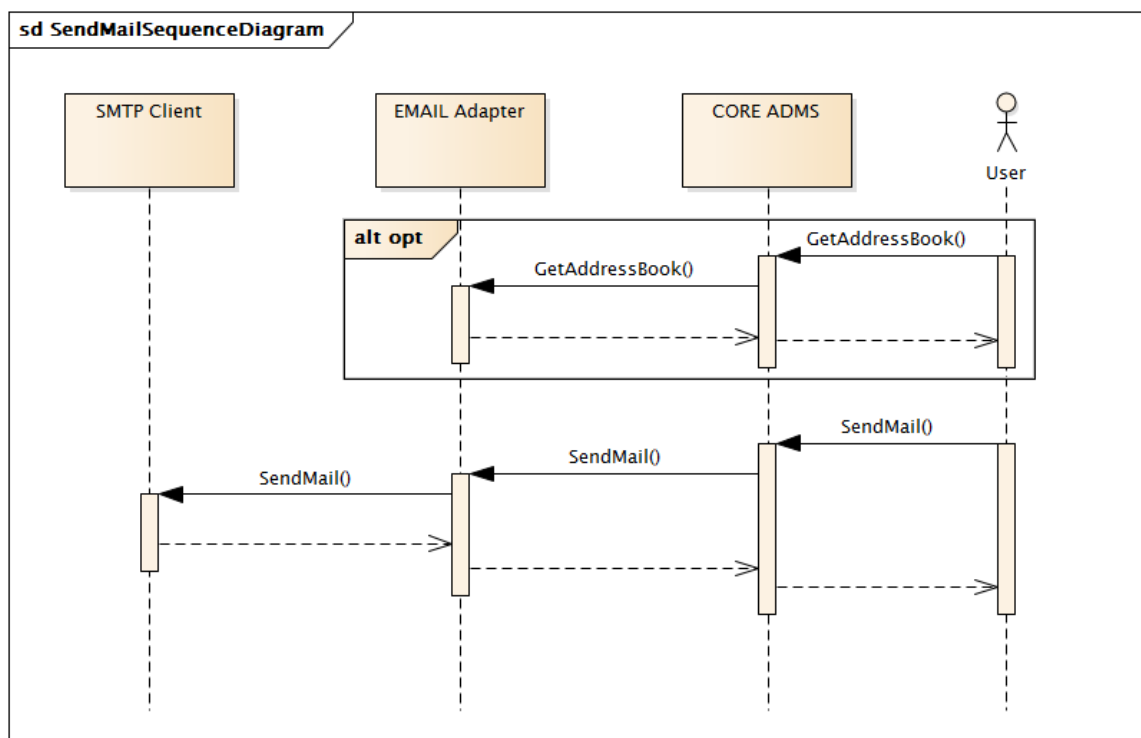


*Figure 5.1 – The SendEmailNotification operation sequence diagram*

Typical process of sending an email notification is shown in Figure 5.1. In order to keep the sequence diagram simpler, only request from CORE zone is shown, even though the user can initiate the process from all zones via DMD application. Data flow goes as following:

- Upon opening the form for creating a notification message, user has an option for querying address book information. Querying address book data is an optional process. DMD application queries data from Email adapter via JMS request.
- Email adapter queries the address book data from a predefined source. Queried address book entries are returned to the user who invoked the operation and are now at disposal.
- User populates the email form correspondingly and invokes SendEmailNotification operation hosted on Email adapter via JMS request.
- Email adapter sends the email notification via predefined SMTP server.

- Result of operation is returned to the user who invoked the operation.

## 5.1.2.    Out of the Box

As an out-of-the-box solution, Email Adapter implements the functionality of sending email notifications via predefined SMTP client. User information is retrieved from the Employee DB on Historical Server in DMZ system (Access Services). EcoStruxure GridOps offers a user-friendly way of managing SMTP server configuration through DMD application. Configuration is stored locally in Subscriptions DB on Historical Server in DMZ system and is used by Email adapter to configure SMTP connection.

### 5.1.3.    Use Cases

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

*Table 5.1 – The SendEmailNotification operation use cases*

| Use Case | Message Mapping | | | Action |
|---|---|---|---|---|
| | **Property** | **Type** | **Value** | |
| Mail successfully sent | Result | String | OK | Email adapter sends an email notification successfully. |
| | Error.code | String | N/A | |
| | Error.level | String | N/A | |
| | Error.reason | String | N/A | |
| | Error.details | String | N/A | |
| SMTP client not available | Result | String | FAILED | Email adapter attempts to connect to the SMTP client with predefined configuration parameters and fails do to unavailability of the server, or misconfiguration. Error is written to a log file and event is created. |
| | Error.code | String | 5.3 | |
| | Error.level | String | FATAL | |
| | Error.reason | String | SmtpClientUnavailable | |
| | Error.details | String | Could not establish a connection to SMTP client. | |
| Message sending failed | Result | String | FAILED | Email adapter could not send the message to corresponding users due to an error reported by SMTP server. Error is written to a log file and event is created. |
| | Error.code | String | 5.3 | |
| | Error.level | String | FATAL | |
| | Error.reason | String | SendingFailed | |
| | Error.details | String | Sending message to {0} failed. | |
| Message sizes exceeds limit | Result | String | FAILED | Email adapter receives a message that exceeds the data limit defined on the corresponding SFTP server. Message is discarded. Error is written to a log file and event is created. |
| | Error.code | String | 5.3 | |
| | Error.level | String | FATAL | |

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| Use Case | Message Mapping | | | Action |
|---|---|---|---|---|
| | **Property** | **Type** | **Value** | |
| | Error.reason | String | MessageSizeExceedsLimit | |
| | Error.details | String | Message size exceeds defined data limit. | |
| Address book source not available | Result | String | FAILED | Email Adapter cannot access the address book source. Error is written to a log file and event is created. |
| | Error.code | String | 5.3 | |
| | Error.level | String | FATAL | |
| | Error.reason | String | AdressBookSourceUnavailble | |
| | Error.details | String | Could not retrieve data from the specified address book source: {0}. Source is unavailable. | |
| Unexpected error | Result | String | FAILED | Email Adapter failed processing the SendMail operation due to an unexpected error. Error is written to adapter log file. |
| | Error.code | String | 5.3 | |
| | Error.level | String | FATAL | |
| | Error.reason | String | InternalError | |
| | Error.details | String | Sending email notification failed due to an unexpected error: {0}. | |

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# 6. SMS SERVICE

## 6.1. Send SMS Notification

### 6.1.1. Overview

Send SMS Notification operation is implemented as a gateway service for sending SMS notifications from EcoStruxure GridOps to relevant end users. Email adapter exposes a WCF service endpoint for utilizing the SMS sending feature. The service translates the incoming requests to corresponding data format and sends them to a physical GSM modem which sends the SMS notification to the end users.

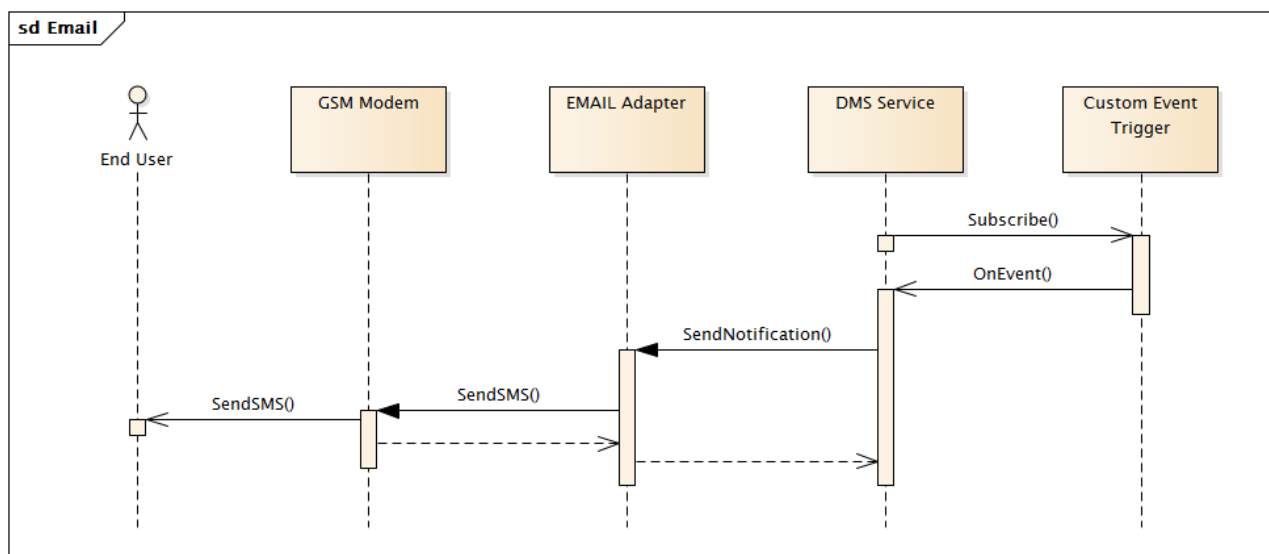The high-level sequence diagram is given in Figure 6.1.



*Figure 6.1 – The SendSMSNotification operation sequence diagram*

Typical process of sending an SMS notification is shown in Figure 6.1. In order to keep the sequence diagram simpler, DMS Service and Custom Event Trigger are introduced. This DMS service can represent any EcoStruxure GridOps service which utilizes the SendSMSNotification feature of Email adapter relevant to the custom event notification trigger. Data flow goes as following:

- DMS Service subscribes to a specific event in EcoStruxure GridOps. This process is not a part of Email & SMS Interface scope and will not be covered in this document.
- The event trigger occurs, Data related to the event is transformed to comply with SMS service contract and forwarded to the Email adapter.
- Email adapter extracts the text message and contact information from the request and invokes the send SMS feature on the GSM modem.
- GSM modem forwards the SMS message to the end user.

Result of operation is returned to the service user who invoked the operation.

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## 6.1.2.   Out of the Box

As an out-of-the-box solution, Email Adapter implements the functionality of sending SMS notifications via *SMSEagle NXS-9750 3G* [4] device. It utilizes built in 3G modem to send/receive SMS messages directly to GSM/UMTS network without using any external 3rd party solutions. The SMSEagle device needs to be deployed either on integration server or a separate gateway server in the DMZ system in order for the adapter to establish a communication with it. Email adapter is configured with the IP address of the SMSEagle device.

*NOTE:*     Email adapter is implemented as easily extensible. A custom plugin can be written in order to replace the physical SMS gateway with another, or to target a proprietary web API for sending SMS notifications.

### 6.1.3.   Use Cases

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

*Table 6.1 – The SendSMSNotification operation use cases*

| Use Case | Message Mapping | | | Action |
|---|---|---|---|---|
| | Property | Type | Value | |
| SMS successfully sent | Result | String | OK | Email adapter sends an SMS notification successfully. |
| | Error.code | String | N/A | |
| | Error.level | String | N/A | |
| | Error.reason | String | N/A | |
| | Error.details | String | N/A | |
| GSM Modem not available | Result | String | FAILED | Email adapter attempts to connect to the SMS modem deployed on the gateway server in DMZ system. Due to its unavailability or misconfiguration of the modem address, security settings, the request fails. Error is written to a log file and event is created. |
| | Error.code | String | 5.3 | |
| | Error.level | String | FATAL | |
| | Error.reason | String | ModemUnavailable | |
| | Error.details | String | Could not establish a connection to the GSM modem. | |
| Message sending failed | Result | String | FAILED | Email adapter could not send the message to corresponding users due to an error reported by GSM Modem. Error is written to a log file and event is created. |
| | Error.code | String | 5.3 | |
| | Error.level | String | FATAL | |
| | Error.reason | String | SendingFailed | |
| | Error.details | String | Sending message failed. Reason {0} | |

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# 7. DEPLOYMENT SPECIFICATION

The Email Adapter provides integration between the EcoStruxure GridOps and clients external applications such as: SMTP server, SMS gateway, AD, User databases, etc. Process is invoked on the various services via intranet WCF service invocation.

The deployment specification is provided in the following table:

*Table 7.1 – The deployment specification*

| Deployment Specification | |
|---|---|
| Application | EmailAdapter |
| 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 |

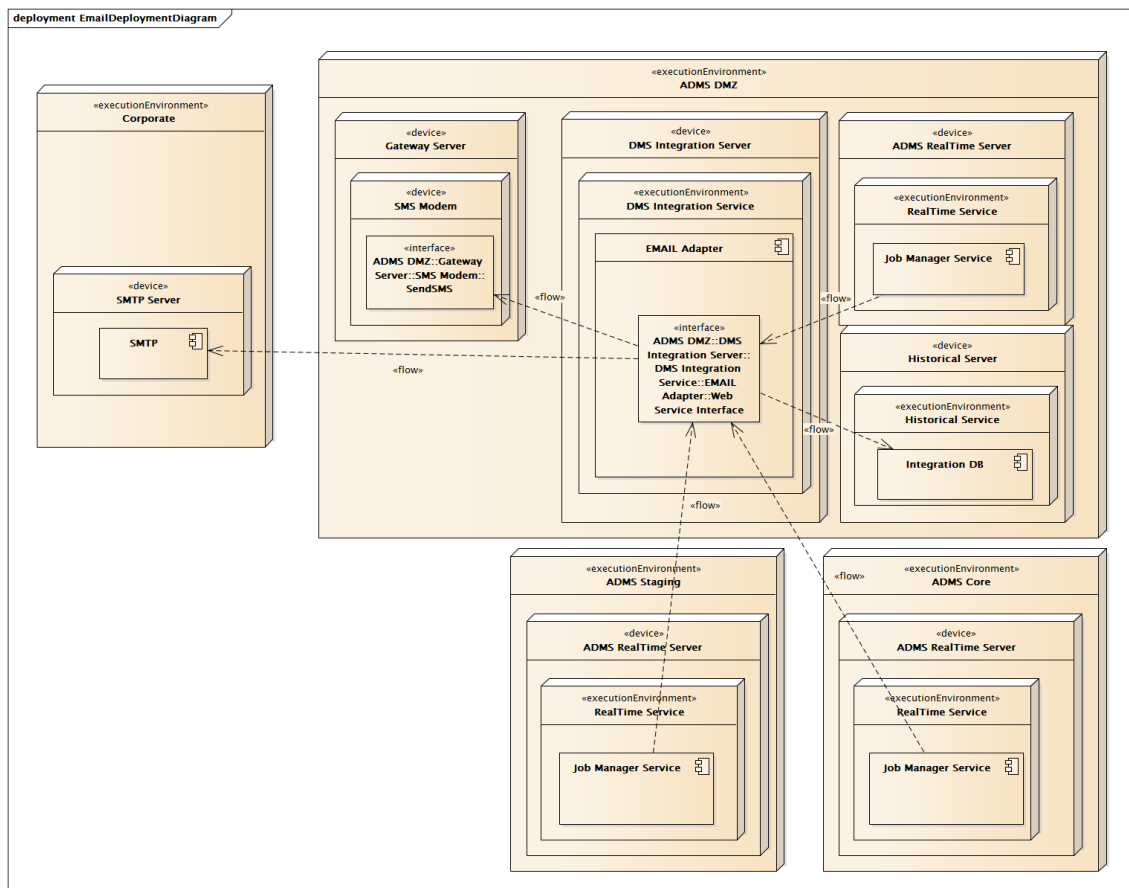Figure 7.1 depicts standard deployment configuration for all Email Integration participants.

*Figure 7.1 – Email Integration deployment diagram*

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# 8. INTERFACE CONFIGURATION

Email 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 Email adapter.

*Table 8.1 – The configuration files specification*

| Name of the config file | Configuration File Description |
|---|---|
| AdapterEmail | Registry configuration xml file |

Details about the structure and shared content of common interface configuration files are located in *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 Email and SMS Interface.zip* file [5].

## 8.1. SMTP Server Configuration

Configuration to the corresponding SMTP server is stored in integration database. Configuration is saved via specialized DMD application control, under **Tools → Internal External Notification → Server Configuration**.



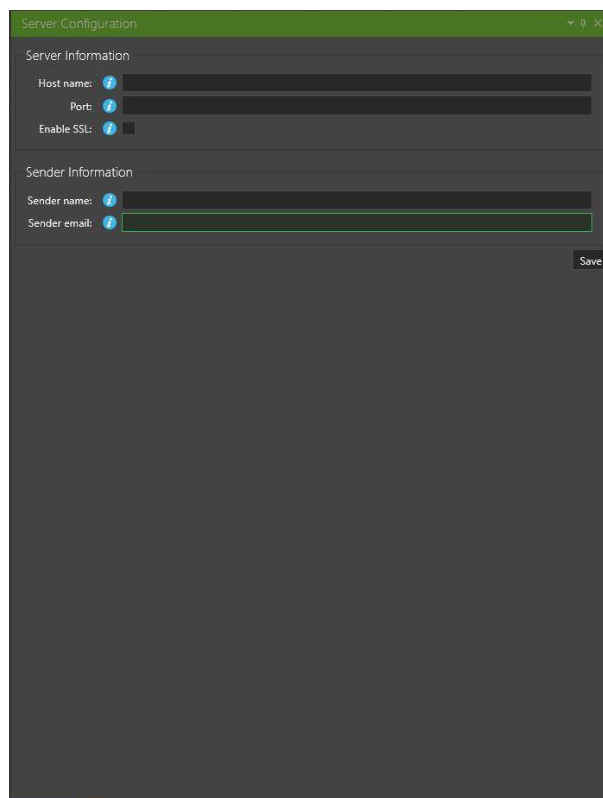*Figure 8.1 – Configuring SMTP server connection parameters*

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# 9. RELEASE NOTES

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

## 9.1. Software Version 3.9

| Feature | Description |
|---|---|
| Address book source | Out of the box address book source has been modified and now uses the newly implemented Employee database located on the Historical Server in the DMZ system. |
| SMTP configuration storage | Out of the box SMTP configuration storage has been modified and now uses the newly implemented Subscriptions database located on the Historical Server in the DMZ system. |
| SMS support | Email adapter was extended with an additional feature for sending SMS notification messages. The feature is implemented similarly as the email feature. It represents a gateway for sending SMS Notification from EcoStruxure GridOps to the corresponding end users. |

# 10.   DEFINITIONS AND ABBREVIATIONS

| Definition/Abbreviation | Description |
| --- | --- |
| AD | Active Directory |
| ADMS | Advanced Distribution Management System (to be provided by Schneider Electric). |
| DMD | Dynamic Mimic Diagram |
| DMZ | Demilitarized Zone |
| ESB | Enterprise Service Bus |
| JMS | Job Manager Service |
| LFS | Local File Share |
| FS | File Share |
| SMTP | Simple Mail Transfer Protocol |
| SOAP | Simple Object Access Protocol |
| WCF | Windows Communication Foundation |
| WS | Web Service |
| XML | Extensible Markup Language |
| XSD | XML Schema Definition |

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