



PRODUCT SHEET

Electrification X

Network Fault Management

For fast and efficient fault handling
[siemens.com/electrificationx](https://www.siemens.com/electrificationx)

SIEMENS

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Overview

Electrification X provides two powerful applications to improve grid reliability and efficiency:

- **Substation Fault Management (SFM):**
Enables operators to monitor protection and power quality devices, access fault records, and analyze trends for optimized maintenance and improved system integrity.
- **Overhead Line Fault Management (OHLFM):**
Automates fault reporting and localization for overhead line networks, reducing downtime and simplifying maintenance through IoT connectivity and advanced analytics.

Together, our solution will deliver:



Secure IoT communication
and cloud scalability



Actionable data for
smarter grid operations



Enhanced transparency and
reduced operational costs

Substation Fault Management

Substation Fault Management is a feature under Electrification X Network Fault Management that empowers power grid operators to efficiently check the operational status of their protection device and power quality (PQ) device. By retrieving fault records and logs, the application enables quick analysis of the protection faults and the optimization of maintenance activities, ensuring improved reliability and performance of the power grid. This application provides real-time insights and analytics, helping operators to promptly address issues, reduce downtime, and enhance overall grid stability.

Customer benefits

- Ensuring transparency in the operation of protection relays and power quality devices to maintain system integrity
- Implementing a comprehensive monitoring system that operates round-the-clock, providing immediate notifications to customers regarding any alarms or trips due to protection events and power quality
- Facilitating access to fault records and visualizations, continuous records enhancing the ease of fault management and analyzing processes
- Streamlining operations through efficient management of various logs, including event, trip, operational, and user-defined logs

- Fetching protection settings helps user to quickly visualize protection parameters
- Providing improved access to continuous recording and trend analysis, making it more user-friendly and accessible
- Leveraging digitalization and effective data management to inform strategic decisions for grid upgrades and enhancements where necessary
- Offering valuable insights into power consumption and distribution patterns over time, aiding operators in optimizing system performance

As your trustworthy partner we provide ...

- Reliable IoT connectivity hardware forms the backbone of any IoT ecosystem, enabling seamless communication between devices and systems
- Open and reliable IoT ecosystem Electrification X
- Electrification X Substation Fault Management provides a comprehensive solution for monitoring and managing the electrical faults in transmission and distribution electrical networks, enhancing transparency and reliability with the help of fault record transfer

Overhead Line Fault Management

Efficient fault management & maintenance of overhead line distribution network requires precise information, often a time-consuming and cumbersome task. Electrification X – Network Fault Management (Overhead Line Fault Management - OHLFM) streamlines overhead line distribution maintenance by simplifying data collection and fault analysis.

This innovative system automates fault reporting and localization through a comprehensive insight, simplifying the process for service engineers to pinpoint vulnerable sections, drill down on sections at risk, for a smarter way of working. Our IoT enable solution is curated to support you:

- Reduced costs and grid downtime through fast and efficient automated fault localization for distribution grids
- Deployable in any area with mobile network coverage with notifications on permanent fault via voice call
- Secure IoT communication to the cloud and “Zero-Config” engineering in the cloud
- A wide range of visualization methods combined with data analytics
- Ease of scaling

Features

This chapter contains the packages, including features, that can be subscribed to within the feature set Network Fault Management.

Substation Fault Management

The Substation Fault Management feature includes the fundamental digitalization of protection relays and power quality devices.

Feature

Transparency of substation fault and power quality

The feature “Substation Fault Management (basic)” enables you to check the operational status of your protection device and PQ device fleet. The fault analysis and notification processes are easy and convenient. The following views are provided as part of this application and are described in more detail below:

Fault Localization

Geographic view of fault localization and a color code showing the Transparency Index, alarms, and local time. Additionally, the latest unacknowledged alarms are shown in a list.

Basic Asset Transparency of Protection Relays and PQ Devices

The PROT15 App, installed within the SICAM 8 Application, retrieves device-related information such as manufacturer details, device type, firmware versions, serial numbers, and product codes.

- SIPROTEC 5 devices with any IEC 61850 on the integrated Ethernet port J or on an equipped Ethernet communication module, either in the base module (port E or port F) or for modular devices with communication extension module CB202 (port N or port P) can be used. PQ meters are connected to RJ45 port to retrieve above information.
- Reyrolle 5 protection relay, through its integrated Ethernet interface, utilizes IEC 61850 protocol architecture retrieving Basic Asset Information.
- PQ devices SICAM P855, Q100 and Q200, through its integrated Ethernet interface, utilizing IEC 61850 protocol architecture retrieving the Basic Asset Information.
- SIPROTEC 4 protection device, enhanced with EN100 communication module¹, utilizes the IEC 61850 protocol to retrieve Basic Asset Information. The EN100 communication module supports the following versions: V04.26.01, V04.29.01, V04.33.01, and V04.40.01.

¹ Any other versions of EN100 communication module shall be discussed with the Product Team

- SIPROTEC 4 protection device, with DIGSI 4 interface (serial or Ethernet), utilizing SIP4Client installed in SICAM 8 application retrieves Basic Asset Information.

3rd Party Devices, PROT15 App utilizing IEC61850 protocol retrieve Basic Asset Information from MiCOM (P14x, P44x), GE Multilin Series, ABB Relion 615 Series and SEL.

SEL protection device, with Telnet protocol (serial or Ethernet), utilizing 3PCONNECT01 installed in SICAM 8 application retrieves Basic Asset Information.

Fault Records (COMTRADE Files), Visualization and Download

Electrification X shows a filterable list of all records in COMTRADE format from the grid. These records can be visualized and downloaded. These records come from protection relays and PQ devices which communicate over IEC 61850 protocol to the IoT Gateway. The PROT15 App installed in the SICAM 8 application, retrieves these records.

- SIPROTEC 5 devices with any IEC 61850 on the integrated Ethernet port J or on an equipped Ethernet communication module, either in the base module (port E or port F) or for modular devices with communication extension module CB202 (port N or port P) can be used for retrieving the Fault records.
- Reyrolle 5 protection relay, through its integrated Ethernet interface, utilizes IEC 61850 protocol architecture retrieving the Fault records.
- PQ devices SICAM P855, Q100 and Q200, through its integrated Ethernet interface, utilizing IEC 61850 protocol architecture retrieving the Waveform records, MCS records and Transient Records.
- SIPROTEC 4 protection device, enhanced with EN100 communication module¹, utilizing the IEC 61850 protocol to retrieve Fault Records. The EN100 communication module supports the following versions: V04.26.01, V04.29.01, V04.33.01, and V04.40.01.

SIPROTEC 4 protection device, with DIGSI 4 interface (serial or Ethernet), utilizing SIP4Client installed in SICAM 8 application, retrieve Fault Records. (COMTRADE - 1997).

3rd Party Devices, PROT15 App utilizing IEC61850 protocol retrieve Fault Records from MiCOM (P14x, P44x), GE Multilin Series, ABB Relion 615 Series and SEL.

SEL protection device, with Telnet protocol (serial or Ethernet), utilizing 3PCONNECT01 installed in SICAM 8 application retrieves Fault Records.

Fault Logs & Trip Logs (COMFEDE Files), Visualization and Download

The Log files show a filterable list of all available log files of the SIPROTEC 5 device with minimum firmware version V7. 90¹ which is supported by IEC 61850 in the Ethernet module and port J of SIPROTEC 5. The available log file types like fault, ground-fault, operational, setting-history, user defined log are depending on the SIPROTEC 5 configuration and availability of the log file as COMFEDE format via IEC 61850. The PROT15 App installed in the SICAM 8 application retrieves these files.

¹ Any other versions of EN100 communication module shall be discussed with the Product Team

Continuous Records (PQDIF File), Download

Fault Recorder 7KE85 and PQ devices SICAM P855, Q100 and Q200 supports continuous recording of files. These files generate Trend records and Measurement records in PQDIF format. The PROT15 App installed in the SICAM 8 application, retrieves these records. These devices should be connected to the ethernet interface and IEC 61850.

Records with Large File Size

Supporting the large files of up to 25MB with continuous records in terms of COMTRADE File and PQDIF file from Fault Recorder 7KE85 and PQ devices.

Aggregated Information of Fault

With the assistance of Related Information of Protection Trip events, users are directed to all fault information including fault records, logs, alarms of within +/- 10sec combined across AOR's level.

Protection Settings and Changes

- PROT15 App; fetch the current protection settings from the SIPROTEC 5 relays, SIPROTEC 4 7SJ66 and ABB Relion 615 series and display in tabular format of Device View. If user changes any settings, notification will appear as an event.
- SIP4Client App; fetch the current protection settings from SIPROTEC 4 relays from DIGSI 4 port and display in tabular format of Device View. If user changes any settings, notification will appear as an event.
- 3PCONNECT01 App; fetch the current protection settings from SEL relays via Telnet and display in tabular format of Device View. If user changes any settings, notification will appear as an event.

Add Analysis to Files

Users can now add analysis/comments to fault records and PQDIF files, making it easy to trace analysis data for each file whenever needed. Analysis comments are editable, allowing users to update the analysis further. Adding and editing comments against records are tracked in the Audit log for transparency.

Additional Functions

- Historical feeder power consumption and asset utilization (based on rated capacity)
- List of feeders of the assets with individual alarm visualization and status
- Customizable SVG uploads for detailed substation Single Line Diagrams, enhancing operational visibility
- Advanced monitoring of individual feeders, presenting real-time operational data and component status for informed decision-making

¹ COMFEDE in SIPROTEC 5 is available from V07.90 for IEC61850.

Overhead Line Fault Management

The features for Overhead Line Fault Management of the feature set Electrification X - Network Fault Management automates the tasks of reporting and locating faults on overhead lines with the use of IoT-enabled devices integrated into our Electrification X cloud platform. The solution ensures universal access to vital overhead line network data, enabling automatic fault detection and localization. By significantly reducing downtime and enhancing maintenance efficiency, it optimizes overall operations seamlessly.

Feature OHL Fault Management Basic

The feature overhead line fault management enables the digitalization of SIEMENS SICAM FSI sensors for fault detection and indication in overhead line distribution networks. In the "Basic" feature, the digitalization includes connecting multiple SICAM FSI locations to Electrification X Overhead Line Fault Management, starting with a minimum of 5 locations per package and monitoring of the SICAM FSI sensor data. In each location, you can connect only one group of FSIs, including the gateway, under this package.

Fast and automatic fault localization

A clear geographic view with color-coded indicators for fault severity and status, along with a list of unacknowledged faults for easy prioritization. This automation minimizes downtime, lowers operational costs, and ensures transparency for faster decision-making.

Enhanced Grid Insight

Analyze load currents through diverse visualization and advanced data analytics, enabling detailed analysis of grid feeder utilization. This versatile tool empowers users to access and scrutinize grid data at any location, facilitating insightful analysis and optimization for enhanced grid performance.

Smarter Maintenance Planning with Fault Prone Zone views

Stay ahead of potential outages with a clear view of where faults are most likely to occur. Leveraging historical fault data from connected devices, the Fault Prone Zone View helps utilities shift from reactive to proactive maintenance by identifying and visualizing fault prone zone sections in the overhead line network.

Efficient Integration

Efficient Integration leverages 'Zero-Config' engineering in the cloud, eliminating complex setups and configurations for seamless deployment. With this approach, systems automatically adapt and connect, simplifying the process and enhancing efficiency in cloud-based operations.

Feature

OHL Fault Management Extended

The feature OHL Fault Management Extended is designed for locations where additional FSI groups are needed, such as at T-junctions or multi-way junctions with spur or tap lines branching from the main feeder. While the feature OHL Fault Management “Basic” supports one group of FSIs (including the gateway) per location, this extension allows you to add extra groups under the same location for complete monitoring of complex overhead line configurations. This ensures flexibility and scalability while maintaining seamless integration with Electrification X Overhead Line Fault Management.

Ideal for:

- T-junctions or 4-way junctions with spur/tap lines
- Locations requiring monitoring of multiple feeder branches under the same circuit

The views described above for the feature OHL Fault Management Basic also apply to the feature OHL Fault Management Extended.

Feature

OHL Fault Management Voice Call

The Voice Call feature in Overhead Line Fault Management ensures timely communication of permanent fault events to service teams. When a fault is detected, the system automatically triggers a voice call to predefined contacts, providing essential details such as faulty section. This proactive alert mechanism helps reduce response time, enabling faster restoration and minimizing downtime. Voice call notifications are especially useful in areas with limited data connectivity, ensuring critical information reaches the right personnel.

Subscription

Standard subscription plan	Electrification X - Network Fault Management
Functions	All
Subscription metric	Base Package Feature Substation Fault Management <ul style="list-style-type: none"> • Transparency of substation fault and power quality Feature Overhead Line Fault Management <ul style="list-style-type: none"> • OHL Fault Management Basic (to connect FSI location/(s); a minimum of five locations is required per subscription) • OHL Fault Management Extended (to connect 1 additional FSI group to an existing location (optional)) • OHL Fault Management Voice Call (voice call notifications (optional), recommended for timely fault communication)
Subscription term	Annually, auto-renewal
Billing term	Annually, payment in advance
Upscale	Effective immediately, pro-rated billing
Downscale/Cancellation	Effective with end of subscription term
Connected devices	To be purchased separately
Permitted users	Unlimited, Extended Use

The Electrification X - Network Fault Management feature set subscription plan is the regular, scalable Offering for this cloud service. The subscription term is twelve (12) months with automatic renewal; the cloud service fee is paid in advance.

The subscription plan can be upscaled at any time and cloud service fees for upscales are calculated on a pro-rated basis. The customer can also scale down the cloud service effective with the end of the current subscription term. The subscription fee will be adjusted for the upcoming billing term. The cloud service can be cancelled any time, effective with the end of the current subscription term.

The subscription plan can be purchased in packages per charging station and per charger or feeder. The subscription plan assumes a charging station refers to one unique postal address or geo coordinates.

Extended Use entitles the customer to authorize its affiliates and third parties to access and use the cloud services in accordance with the rights set out in the Terms and Conditions.

Prerequisites

Electrification X Tenant

The Electrification feature set is operated on an Electrification X Tenant. Therefore, a tenant with an Electrification X Base Package is required. The Electrification X Base Package has a subscription term of 12 month and must be purchased together with the Substation Fault Management – Basic Asset Transparency of Protection Relay & Power Quality device, Protection Settings, Fault Localization including File Transfer per relay per month, if not otherwise already available and in operation.

Supported connected devices

The cloud service is currently compatible with commercially available connected devices from Siemens. A description of the available connected devices is provided below.

A connected device must be purchased and installed on premises at a site specified by the customer as agreed between the customer and Siemens to use the cloud service. The customer is responsible for installing the connected device at the site and any associated costs to perform said cloud service in accordance with related documentation for the connected device.

List of supported connected devices:

- For Substation Fault Management SICAM CP-8031/CP-8050
- For Overhead Line Fault Management SICAM FCG (Fault Collector Gateway), SICAM FSI V1 (Fault Sensor Indicator) or SICAM FSI V2 (Master and sensors)

For order information, customer may contact its local sales representative.

Web browser and viewing devices

Google Chrome and Microsoft Edge browsers have been tested and are recommended to be used to access the cloud service. Other modern standard web browsers will likely be compatible. A screen resolution of 1920 x 1080 pixels or higher is recommended for best user experience.

Internet connection

The bandwidth of customer's internet connection determines the performance of the cloud service.

Ordering

Ordering process for the subscription

To order the cloud service for the first time, customer must request a quote from its Siemens sales representative. Depending on the offering either with services, then customer will receive a link to his tenant, or without services, then the customer will receive a link to the shopping cart. In this case customer needs to (i) choose the payment options and (ii) accept the Terms and Conditions to start using the cloud service. The "Terms and Conditions" consist of the "Supplemental Terms Electrification & Automation", the Base Terms and the General Software and Cloud Supplemental Terms, the Acceptable Use Policy, the Siemens Data Processing Terms, this Product and Service Data Sheet and any other Supplemental Terms which may be referenced in either of the mentioned documents. Customer may upgrade, downgrade, and cancel the cloud services directly in the Subscription Manager store <https://subscribe.siemens.com>.

Ordering connected devices

To order connected devices the customer may request a quote from its Siemens sales representative.

Connected device

For Substation Fault Management

- SIEMENS: SICAM CP-8031/CP-8050

For Overhead Line Fault Management

- SICAM FCG (Fault Collector Gateway) with
- SICAM FSI V1 (Fault Sensor Indicator) or
- SICAM FSI V2 (Master and sensors)

Ordering

For order information, customers may contact their local sales representative.

Product documentation

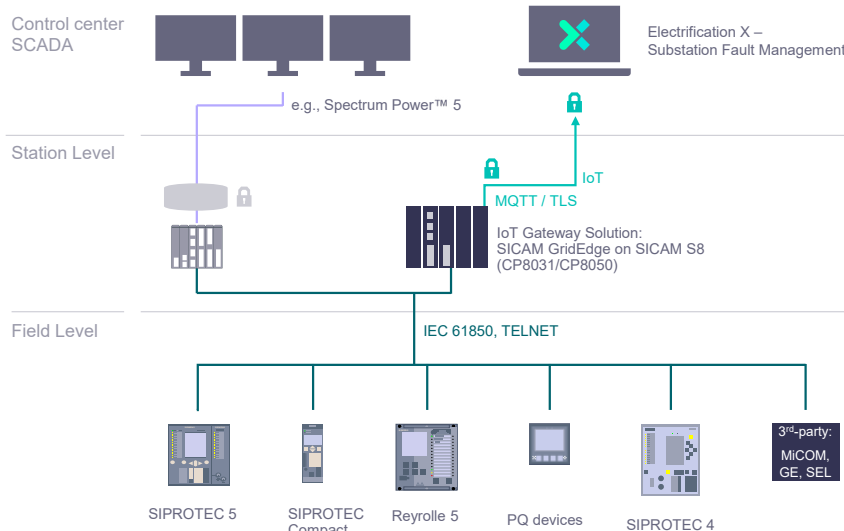
Technical documents	Document ID	Document ID German	Document ID English
Building X – Accounts User Guide	A6V12050070		
Building X – Devices User Guide	A6V12050067		
Electrification X – Base Package Operating Manual		E50417-H7500-C200-A6	E50417-H7540-C200-A6
Electrification X – Engineering Guide		E50417-H7500-C203-A6	E50417-H7540-C203-A6
Electrification X – Network Fault Manage- ment Operating Manual		E50417-H7500-C202-A5	E50417-H7540-C202-A5
Electrification X – Security Manual		E50417-H7500-C204-A6	E50417-H7540-C204-A6

[↗ Technical documents can be downloaded here](#)

Topology

Substation Fault Management technical setup

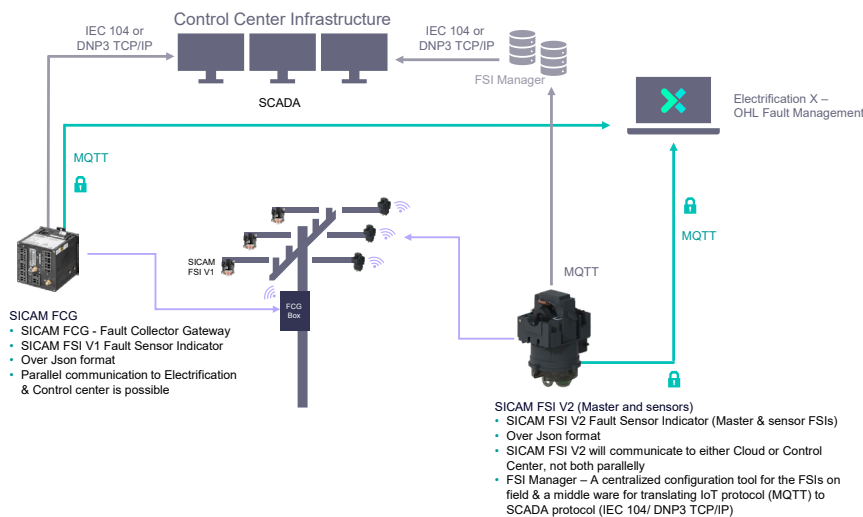
End-to-end cybersecurity



Data communication between the connected devices on premise and the cloud service requires internet connectivity (to be provided by the customer)

Overhead Line Fault Management technical setup

End-to-end cybersecurity



Data communication between the connected devices on premise and the cloud service requires internet connectivity (to be provided by the customer)

Key benefits



Enhanced transparency of protection relays and PQ devices



Supports file transfer during the time of fault



Precise fault Information

Key benefits



Swift fault clearance via localization & notification



Identification of fault prone zones



Reduced grid construction costs

Customer support

Siemens offers helpdesk support.

Customer may contact its local Siemens representative for support requests.

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