EcoStruxure for Retail

Specification

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1 Introduction

1.1 Description

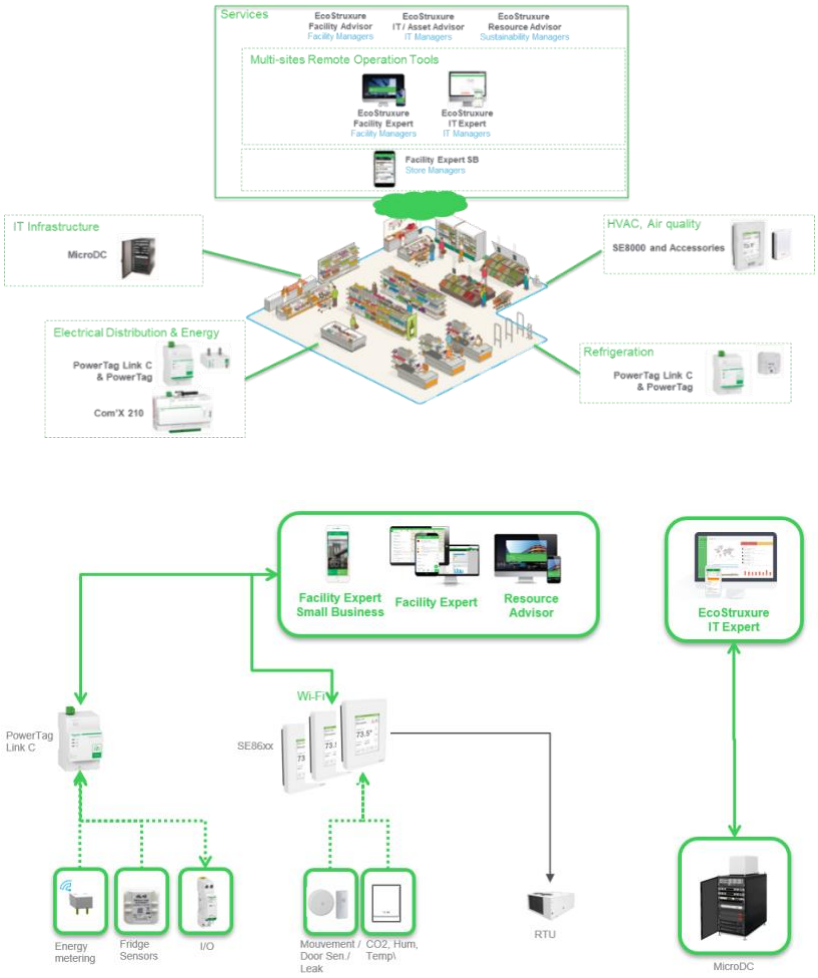
Supply, Install, Program and Commission a Schneider Electric EcoStruxure for Retail architecture including temperature monitoring, energy monitoring and control modules.

The architecture is to consist of IOT devices directly connected to the cloud that provide automatic dashboards that are simple and intuitive to use.

The energy monitoring devices shall be PowerTag®, a compact Class 1 wireless communication energy sensor that monitors and measures energy and power in real time.

The Control modules and Temperature monitoring devices shall be of the PowerTag® series.

1.2 Architecture



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2 Hardware

2.1 Electrical Distribution Board (EDB)

Electrical Distribution Boards shall be enabled with a main monitoring device capable of monitoring electrical measurements and alarms.

Energy sensors shall be installed directly on breaker terminals up to and including 630A and collect voltage directly from it.

Energy sensors shall communicate wirelessly with Ethernet gateway (no communication cables) with a limited Isotropic Radiated Power up to 0dBm (or 1mW).

Wireless communication shall be encrypted on AES128 bit CCM and using star topology only (no mesh).

Energy sensors shall provide:

- Active energy (kWh): total and partial, delivered and received (class 1 IEC 61557-12)
- Active energy (kWh): per phase (class 1 IEC 61557-12)
- Reactive energy (kVARh): total
- Active power (W): total and per phase
- Reactive and Apparent power (VAR, VA): total
- Voltage (V): phase-to-phase (U12, U23, U31) and phase-to-neutral (V1N, V2N, V3N)
- Current (A): per phase (I1, I2, I3)
- Power factor
- Frequency
- Alarm in case of voltage loss
- Alarm in case of current overload
- Pre- alarms in case of 80% of nominal current

In case of failure of communication with gateway, the energy sensor device shall continue measurements and keep recording the Active energy index.

Device	References	Description
 *PowerTag NSX*	LV434020 – 250 A, 3P LV434021 – 250 A, 3P+N LV434022 - 630 A, 3P LV434023 - 630 A, 3P+N	For Compact NSX, Compact INS / INV offers: circuit breakers and switches, rating less than or equal to 250 A (35 mm pitch) or 630 A (45 mm pitch).
 *PowerTag Link C*	A9XELC10 - Acti9 PowerTag Link C - cloud connected communication module	A complete and comprehensive gateway that provides you with a fully connected electrical panel by storing and transmitting data between Acti9 devices and the cloud.

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2.2 Final Electrical Distribution Board (FDB)

Final Electrical Distribution Boards shall be enabled with a load monitoring device capable of monitoring individual loads and electrical measurements and alarms on load failure.

Energy sensors shall be installed directly on breaker terminals up to and including 63A and collect the voltage directly from it.

Energy sensors shall communicate wirelessly with Ethernet gateway (no communication cables) with a limited Isotropic Radiated Power up to 0dBm (or 1mW).

Wireless communication shall be encrypted on AES128 bit CCM and using star topology only (no mesh).

Energy sensors shall provide:

- Active energy (Wh): total and partial (class 1 IEC 61557-12)
- Active energy (Wh): per phase (class 1 IEC 61557-12)
- Active power (W) total and per phase
- Active power (W): total and per phase
- Voltage (V): phase-to-phase (U12, U23, U31) and phase-to-neutral (V1N, V2N, V3N)
- Current (A): per phase (I1, I2, I3)
- Power factor
- Load operating time counter (h)
- Alarm in case of voltage loss
- Alarm in case of current overload
- Pre- alarms in case of 0%, 45% or 80% of nominal current

In case of failure of communication with gateway, the energy sensor device shall continue measurements and keep recording the Active energy index.

Control Modules:

Final Electrical Distribution Boards shall be fitted with devices to control loads and to monitor circuits by collecting status of a contact.

Control modules shall communicate wirelessly with Ethernet gateway (no communication cables) with a limited Isotropic Radiated Power up to 0dBm (or 1mW).

Control modules shall have one digital output 230Vac dry contact, normally open or normally closed.

Control modules shall have 2 inputs 230Vac dry contact to collect status.

Control modules shall be installed on Din rail with 18mm width size.

Gateway:

Gateway shall be supplied using 110/230 Vac power supply.

Gateway shall communication with upstream system using ethernet (including open Modbus TCP/IP) protocol over 10/1000 Mbps Ethernet network.

Gateway shall communicate to up to 20 wireless energy sensors and control modules.

Gateway shall auto-discover wireless energy sensors and control modules and allow to customize or label each load monitoring device separately including the type of connected load.

Gateway shall allow customizable thresholds for alarms for electrical measurements, loss of voltage and overload.

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Gateway shall be able to detect and alert on communication loss of wireless sensors.

Gateway shall have embedded diagnostics for the communication performance.

Installation of wireless energy sensors, control modules and the gateway in the distribution boards shall be tested and provided with factory acceptance test report (FAT).

Device	References	Description
 *PowerTag Monoconnect M63*	A9MEM1520 - 1P+W Top and Bottom position A9MEM1521 - 1P+N Top position A9MEM1522 - 1P+N Bottom position A9MEM1540 - 3P+W Top and Bottom position A9MEM1541 - 3P+N Top position A9MEM1542 - 3P+N Bottom position	For Acti9 and Multi9 Monoconnect offers: “Single terminal” circuit breakers, RCDs and switches with an 18 mm pitch between phase and neutral, rating less than or equal to 63 A.
 *PowerTag Phase Neutral P63*	A9MEM1561 - 1P+N Top position A9MEM1562 - 1P+N Bottom position A9MEM1563 - 1P+N Bottom position (for RCBO) A9MEM1571 - 3P+N Top position A9MEM1572 - 3P+N Bottom position	For Acti9 and Multi9 Phase Neutral offers: “Single terminal” circuit breakers, RCDs and switches with a pitch of 9 mm between phase and neutral, rating less than or equal to 63 A.
 *PowerTag Flex A9 F63*	A9MEM1560 - 1P+N Top and Bottom position A9MEM1570 - 3P+N Top and Bottom position	For other devices and specific installations, with rating less than or equal to 63 A.

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 *PowerTag C(control)*	A9XMC1D3 - PowerTag C IO 230V digital input output module	
 *PowerTag Link C*	A9XELC10 - Acti9 PowerTag Link C - cloud connected communication module	A complete and comprehensive gateway that provides you with a fully connected electrical panel by storing and transmitting data between Acti9 devices and the cloud.

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2.3 Fridge/s, Coolroom/s and Freezer/s Temperature Monitoring

The fridge/s, coolroom/s and freezer/s temperature monitoring shall be integrated into the ***PowerTag®*** energy monitoring system in order to be able to combine temperature of the fridge and energy/power consumption.

The acquisition of temperatures shall be wireless.

The battery shall be powered sensors that last for 2 years, are suited to installation in refrigerated or heated environments between -30°C e +55 °C, with the following specifications:

- +/- 1 °C
- IP 65
- Range of 100m [open field]

In addition, a relay antenna can be used if distance is not covered by the sensor.

- Wireless and battery less range
- Polycarbonate
- No temperature sensor limitation
- Omnidirectional
- 300 m transmitter in box type XAL D, receiver in metal enclosure and use relay-antenna

Device	References	Description
 *PowerTag Ambient*	A9XST114 - PowerTag Ambient for Temperature (set of 4)	PowerTag ambient temperature sensor 1 reference for set of 4 sensors: A9XST114 • 30°C to +55°C • +/- 1 °C • IP 65 • Range of 100m [open field] • 2 to 4 years of battery life
 *ZBRA 1*  *ZBRA3*	ZBRA1 – Relay antenna ZBRA3 - Passive antenna to pass through a wall	Relay Antenna • Wireless and battery less range • Polycarbonate • No temperature sensor limitation • Omnidirectional • 300 m transmitter in box type XAL D, receiver in metal enclosure and use relay-antenna
 *PowerTag Link C*	A9XELC10 - Acti9 PowerTag Link C - cloud connected communication module	A complete and comprehensive gateway that provides you with a fully connected electrical panel by storing and transmitting data between Acti9 devices and the cloud.

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2.4 HVAC and Air Quality Control

The HVAC and Air Quality shall be controlled by a SE8600 series controller, designed for single-stage and multi-stage control of heating/cooling equipment such as self-contained indoor (split systems) or package units and fresh air systems. By default, controllers shall communicate using BACnet™ IP, and ZigBee™ Pro radio. Controllers are to be programmed with standard applications that can be selected in the user interface, via BACnet or ZigBee communication. Controllers must also offer a programming engine allowing modification of standard applications to meet specific project requirements

The controller shall be:

- Manufactured within a systems certified ISO 9001 and ISO 14001 facility
- Controller shall be able to communicate with Cloud and BMS at the same time using BACnet™ IP (with an additional module)
- Controller shall be able to communicate using ZigBee™ Pro wireless protocol with the onboard ZigBee radio
- Controller with the wireless option can communicate with specified ZigBee Pro enabled end devices by default.
- Controller shall be equipped with a TFT transmissive LED-backlit LCD touch screen with a 70.08 mm x 52.56 mm (2.759-inch x 2.069 inch) active area. Display colours of LCD screen shall be a customizable choice among 5 colour options.
- Controller shall have a removable fascia that can be customized with replacement fascia available in multiple styles and colours.
- Controller shall have an embedded local configuration utility using the touch screen allowing for simplified configuration, sequence selection, re-initialization, setting of setpoints and control of display settings. Controllers requiring external configuration tools or network interface for start-up and configuration are not acceptable, except to set the cloud and wi-fi configuration.
- Controller shall be configurable by default for display in several languages.
- Controllers shall be customizable with one of at least 12 different user interfaces selected based on intended use (Hospitality or Commercial) and level of local control.
- Controller shall achieve accurate temperature control using a PI proportional-integral algorithm. Traditional differential-based controllers are not acceptable.
- Controller shall utilize EEPROM memory to back up local configuration parameters in the event of power failure. Controllers requiring batteries or having no provisions for data retention during loss of power shall not be acceptable.
- Controller shall have inputs for remote mixing/return temperature sensors, outdoor temperature sensor and discharge air temperature sensor.
- Controller shall have removable connectors for easier wiring.
- Controller shall have password protection to prevent unauthorized access to the configuration menu parameters.
- Controller shall have six (6) adjustable lockout levels limiting access
- Controllers shall be provided with intelligent HMI, which will display services only as are available as switched through local digital input or network layer such as:
    - Outdoor air temperature displays only enabled when outdoor air temperature sensor is connected.
    - COM Address and various other parameters when a communication module is integrated inside the unit.

Concerning the application:

- The low-voltage rooftop unit controller shall have built-in programs capable of performing the following applications:
    - Indoor air quality
    - CO2 sensor
    - Fresh air sensor
    - Single stage heating and cooling;
    - Multi-stage heating and cooling (2 heat / 2 cool);
    - Economizer

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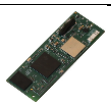
  - For applications not covered by built-in program, the controller must accept custom programs to match project requirements.
- Controller shall have built-in frost protection for all system modes pre-configured at 42 °F (5.6 °C). Frost protection can be enabled or disabled.
- Controller shall support continuous, “smart” and auto-fan sequences.
- Controller shall have integrated changeover function, which will allow seamless switching between cooling and heating mode based upon temperature or network value input.
- Controller shall be capable of local or remote override during unoccupied mode. The controller shall resume occupied set points and will revert to unoccupied set points after a certain amount of time (adjustable from 0 – 24 hours in one-hour increments).
- Controller shall have configurable temporary or permanent local override set points. When the “temporary set points” mode is enabled, once the temporary occupancy timer expires, the set points will revert to their default values.
- Controller shall have configurable maximum heating set points (40 to 90 °F, 4.5 to 32.0 °C) and minimum cooling set points (54 to 100 °F, 12.0 to 37.5 °C).
- User shall have the ability to link the heating and cooling set points and define a minimum dead band between them (from 2F to 4 F, 1 °C to 2.0 °C).
- Proportional band of the PI algorithm shall be adjustable (from 3 °F to 8 °F, 1.7 °C to 4.4 °C).
- Controller shall have an adjustable anti-cycling on/off operation time of cooling and heating stages from 0 minutes to 5 minutes.
- Controller shall have adjustable number of allowed heating and cooling cycles per hour.
- Controller shall have an auxiliary contact that can be used to energize peripheral devices such as: lighting equipment, exhaust fans, economizers, etc. This contact shall operate in parallel with the internal occupied/unoccupied schedule of the controller or the remote night setback contact if UI16 or UI17 is used. When the system is in OFF mode, the contact shall remain in its unoccupied status independently of the occupied / unoccupied schedule unless configured otherwise by a custom application (for example, if lighting should not be turned off).
- Controller shall have an adjustable changeover set point from 14°F to 70°F (-10.0°C to 21.0°C) based on outside air temperature for economizer function. The controller will switch between mechanical (compressor) cooling or free cooling (economizer) based on this set point.
- Controller shall have an adjustable minimum outside air damper position from 0% to 100% for economizer function. This function shall be enabled on when the controller is in “occupied” mode.
- Controller shall have an adjustable free cooling mixed air set point 50°F to 90°F (10.0°C to 32.0°C) for economizer function if mixed air temperature sensor is installed. The controller shall have the ability to display the mixed air temperature directly on the LCD screen.

Device	References	Description
 *8000 Series*	SE8650U0B00 - RTU, RH, Silver SE8650U0B11 - RTU, RH, White SE8650U5B00 - RTU, RH, PIR, Silver SE8650U5B11 - RTU, RH, PIR, White SE8650U5B00P - RTU, RH, PIR, Zigbee, Silver SE8650U5B11P - RTU, RH, PIR, Zigbee, White	Rooftop unit, heat pump and indoor air quality room controller
 *Wi-Fi module*	VCM8002V5031 - Snap-in Wi-Fi Module for VT/SE8000 series	Wi-Fi module for cloud compatibility, BACnet IP and email notification

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 *CO2, Humidity, Temperature sensor*	SED-CO2-G-5045 - Wireless CO2 sensor with room temperature and humidity SED-TRH-G-5045 - Wireless sensor with room temperature and humidity	Wireless sensor
 *Water leakage sensor*	SED-WLS-G-5045 – Wireless water leakage sensor	Wireless sensor
 *Door contact sensor*	SED-WDC-G-5045 – Wireless door contact sensor	Wireless sensor
 *Motion/Temperature/Humidity Sensor*	SED-MTH-G-5045 - Wireless Motion, Temperature & Humidity Sensor	Wireless sensor
 *Wireless wall mounted motion sensor*	SED-WMS-P-5045 - Wireless Wall Mounted Sensor	Wireless sensor

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2.5 IT Infrastructure and Edge computing

Supply and install a preconfigured Schneider Electric Micro Data Center (Micro DC) as directed by the clients representative, designed to allow IT equipment to be pre-installed before shipment, complete with data center physical infrastructure and management software in a single self-contained and secure enclosure.
The solution shall be:

- Pre-engineered and Factory Assembled - Prefabricated Modules designed and built to precise client specifications in a controlled factory environment utilizing DCIM software and shall be tested and provided with factory acceptance test report (FAT).
- Simple and Fast Deployment - Prefabricated Data Center Modules to arrive on site ready to deploy.

Device	References	Description
 *NetShelter CX – Furniture Enclosures*  *Wall-mount Enclosures*	On-demand	Designed for branch offices, small offices and any non-IT space where there isn't the room, the time or the budget to build a dedicated IT zone - the NetShelter CX server enclosure is an ultra-portable, secure, economic, plug-and-play IT solution. You simply roll it in to the open office, put your equipment inside, plug it in and close the doors. With the NetShelter CX Soundproofed 'Server Room in a Box' you can get back to focusing on your core business quickly
 *UPS*	On-demand	Smart-UPS™ are trusted by millions of IT professionals throughout the world to protect equipment and critical data from costly interruptions by supplying reliable, network-grade power reliably and efficiently. Available in a variety of forms factors and classes (entry level, standard and extended run), there is a model for nearly every application and budget. Standard models are the most popular UPS in the world for business servers, storage and network devices and have long been considered the benchmark for reliability and manageability. Entry level Smart-UPS models are an economical choice for small and medium businesses looking to protect small networking devices, point-of-sale (POS) equipment and entry level servers. The extended run models accept external battery packs for long runtime to power critical servers, security and communication systems through outages that could last hours.
 *NetBotz for Environment & Security*	On-demand	Physical threat monitoring solutions from network closets to data centers - Optimize your Security and Environmental Monitoring Appliance with a full range of options - Protects against environmental or human physical threats that cause disruption or downtime to IT assets
 *PDU, Server Access, Containment & Airflow management, Rack cooling, …*	On-demand	

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3 Software

3.1 Application for Store Manager

(1) Description

The solution shall be an easy mobile application available on IOS and Android devices. The solution shall be deployed quickly without long and complex integration.

The solution shall enable to:

- Ensure business continuity
  - Identify quickly equipment failure and receive alerts 24/7 in case of issue
  - Shorter reaction time to events by accessing key data

- Run business more proficiently
  - Reduce administrative task by generating automated HACCP reports
  - Comply with sanitary rules by relying on automated cooler & freezer temperature monitoring systems
  - Remotely switch on and off a targeted device

- Energy efficiency
  - Identify off-hours consumption of HVAC equipment and lighting
  - Keep energy consumption of the store under control

(2) Details

The application for Store Manager shall enable to keep clients connected anywhere, anytime in order to:

- Optimize energy consumption by monitoring usage - per individual load type
- Monitor and compare energy consumption of equipment for specific periods of time
- Control electrical equipment, onsite or remotely
- Schedule equipment on/off times, onsite or remotely
- Monitor critical loads, for 24/7 visibility
- Receive notification in real-time, in the event of equipment issues or unplanned power shut-off
- Receive notification when equipment is on or off as planned
- Monitor the temperature of your refrigeration and be notified in case of abnormal temperatures
- Create the daily temperature report

The installation connectivity shall be possible in any new or existing electrical panel.

The mobile application shall be compatible with IOS and Android devices.

Solution	Reference	Description
	Available on Google Play and Apple Stores *EcoStruxure for Small Business* *EcoStruxure Facility Expert SB* *Schneider Electric SA*	EcoStruxure Facility Expert for Small Business is a connected solution which gives the possibility to small business owner to reduce the risk of issue with key equipment and shorten his reaction time to events. Remotely, at any time, the business owner has instant access to key data, bringing peace of mind and quicker problem resolution. He can also implement energy efficiency actions without compromising the effectiveness of his company. In addition to that, he will also now be able to remotely switch on and off a targeted device and monitor and generate reports regarding the temperature of his fridge/ cold room. This thanks to a mobile application that provides intelligent alarms and visibility on the operation of key equipment.

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3.2 Application for Multi-sites Operation & Energy Manager

(1) Description

The solution shall be a software as a service platform. The solution shall be deploying quickly without long and complex integration.

The Energy solution shall enable to:

- Keep energy budget under control
  - Leverage energy KPIs to report and forecast budgets/invests
  - Monitor costs and consumption trends of your entire portfolio
  - Set targets and alerts by stores

- Benchmark stores portfolio
  - Compare store with ratio per m2, open hours, local weather conditions
  - Benchmark stores portfolio to identify worst performers
  - Compare equipment performance across stores & identify best investment opportunities

- Reduce energy costs
  - Track consumption during closed hours with related contributors
  - Compare consumption over periods
  - Understand energy costs & optimize your tariff

- Achieve sustainability goals
  - Benchmark with local energy performance scales
  - Monitor energy production & Greenhouse gases emission
  - Show green image & stores achievements to customers with an energy kiosk

The Operation solution shall enable to:

- Enable repairs faster and free the store manager from dealing with the issue
  - Be alerted 24/7 in case of issues: cooler/freezer temperatures, load power supply issues, abnormal equipment operations (On, Off, Standby)
  - Diagnose remotely by accessing equipment data
  - Assign immediately a task to the right technician/contractor to fix the issue
  - Track the repair, be informed when job is done and receive the report

- Ensure all stores comply with food regulation
  - Get the actual status of all coolers/freezers in the stores
  - Track temperatures incidents
  - Monitor temperatures trends (actual, min/max, average)

- Ensure maintenance traceability and regulatory compliance in all stores
  - Asset tracking
  - Preventative maintenance plan with task lists
  - Maintenance reminders
  - Intervention log history
  - Document repository for maintenance reports

- Improve maintenance efficiency
  - Improve collaboration, share information across maintenance teams
  - Analyse preventative / corrective maintenance
  - Identify repetitive equipment breakdown

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(2) Details

The Operation and Maintenance services shall provide

- 24/7 Access to a web portal and an hourly update of data
- Application for Smartphone and Tablet
- Availability of 3 years historical data
- Half day on site with energy expert to define year objectives
- Half day on site with energy expert to review passed year's performance
- Semi-annual report on operation & maintenance performance and alerts with recommendations

The Operation and Maintenance services shall provide the following items both through a web portal, mobile devices such as smartphone and tablets and through a periodic report:

Operations features
Operation features access shall be able through mobile, tablet and web browser.
The software shall be able to use as an electronic logbook to schedule, manage, record and track all the operational tasks/actions on-site or remotely.

Asset
The software shall be able to create assets in detail. e.g. name, parent, type, brand, model, references, serial numbers, commission date, lifetime, firmware, id etc.
The software shall be able to generate and assign QR codes to assets.
The software shall provide both geographic view (especially for multiple buildings or sites) and list view of all the assets created and their status.
The software shall provide a summary and detailed view for each individual asset. It shall show general information when created, log history, tasks, community/sharing, measures and attached files.

Task
The software shall be able to create tasks (no recurrence or recurrence) and assign to contributors.
The software shall be able to provide notification/reminder when the task is due.
The software shall provide both calendar view and list view of all the tasks.
The software shall provide an ability to log information e.g. status, date, duration, comments, measures and attached files when the task is completed.

Alert and alarm
The software shall provide at least 3 status of assets by colors, green (normal), amber(alert) and red (alarm).
For connected assets, the software shall generate alarms automatically with suggested solutions. These alarms shall be managed by energy server.
For non-connected assets, the software shall provide an access to log status of assets manually by contributors.
Alert and alarms shall be able to change to green once the problem is solved.

Community
The software shall provide at least two types of accounts, contributors and viewers. The software shall provide a platform for communication among contributors and viewers.

Report
The software shall provide features of generating reports by data log and services summary.

Notification
The software shall provide notification features regarding tasks, comments, sharing actions, normal status, alerts and alarms. Notification preference shall be able to set. Notification shall be sent to PC, tablet and Mobile in real-time.

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Solution	Description	
	EcoStruxure Facility Expert ***Energy Web portal*** **+** EcoStruxure Facility Expert ***Operation Mobile & Web*** + SVSFE0004 – Multi-sites license	***Software as a service for a proactive and conditional approach to a total asset management plan.***

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3.3 Application for IT Manager

The solution shall enable:

- Easy deployment: Easy to register, download and implement.
- Benchmarking for proactive device performance management: Benchmark your devices against total population – see how well your assets perform compared to others
- Analytics for smarter decision-making: Save time, remove alarm storms, and understand the root cause of an alarm to better predict and avoid it happening again.
- Pay as you go for simplified budgeting: Flexible subscription model, pay as you go – where you know what the monthly costs will be.
- Vendor agnostic for one-stop distributed IT infrastructure management: shall works with 3rd party vendors and covers all your networked assets.
- Assessments for optimized device maintenance: Centralized visibility and consolidated alarm notification with recommendations on where to focus your attention.

Services shall be available:

- 24/7 expert monitoring: Remote monitoring by the Schneider Electric Service Bureau
- Incident tracking: Incidents are automatically created and tracked, providing easy access to real-time incident status, incident history and chat history.
- Staff on duty: Set on or off duty status to avoid getting called by the Schneider Electric Service Bureau when you don't want to be disturbed – we will simply call whoever is on duty in the case of a critical incident!
- Monthly report: The personalized report provides insight into connected devices, and recommendations on how to improve device utilization and lifecycle
- Real time notifications: The EcoStruxure IT app gives you an instant overview of your sensor data and alarms.
- Chat collaboration on incidents: Troubleshoot alarms quickly by having Schneider Electric Service Bureau staff join in on the incident-based chat.
- Proactive service dispatch: Physical infrastructure threats can be anticipated, identified, and resolved quickly and accurately with onsite support dispatch if required.
- Global visibility: Global visibility across the hybrid ecosystem – from anywhere – with one tap access right from a smartphone

Solution	Reference	Description
	EcoStruxure IT Expert	Simplify hybrid IT management with EcoStruxure IT Expert. The EcoStruxure IT app and web interface enables proactive recommendations, and secure, wherever-you-go visibility.

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4 Services

On top of software as a service solution, the solution provider shall be able to provide additional services through service bureau and analytics.

These services shall cover:
- Energy and Sustainability
- Asset smart management
- Smart analytics

5 Compatibility with 3rd party platforms

The solution provided shall be compatible with 3rd party platform.

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