

ADVANCED MONITORING AND AUTOMATION APPLICATIONS

The SIMPLE™ Platform for Advanced Distribution Automation

A modular grid-edge solution with advanced monitoring, computation, and communication capabilities

The SIMPLE platform offers functionalities required to build various nodes for comprehensive distribution feeder automation and Distributed Energy Resource (DER) control applications.

The Need

With the proliferation of DERs, monitoring and control of distribution assets has become more essential than before to ensure enhanced visibility of electrical distribution grids. More specifically, controlled operation of fast-acting DERs is becoming more critical to manage the impacts of DERs on distribution grids and to improve system reliability and performance (i.e., loading, voltage profile, losses, etc.).

The Solution

The SIMPLE (Sensors with Intelligent Measurement Platform and Low-cost Equipment) platform offers a low-cost, secure, modular, and low-maintenance measurement and processing platform that can be easily integrated into existing distribution feeder equipment and automation schemes to enhance system reliability and operation through managed control of distribution assets including DERs.

Features

Integrated Intelligent Measurement Device

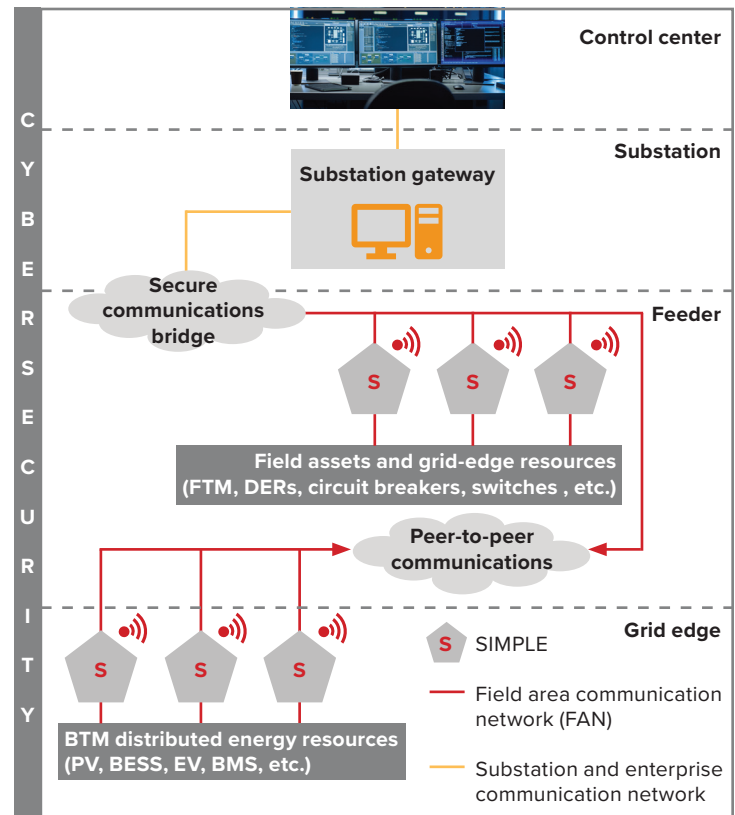
- Signal processing of sensor inputs
- Sensor performance compensation and correction
- Creating various data models.

Advanced Application Module

- Implementing various distribution control and automation application logics
- Advanced protection schemes.

Interface and Communication Module

- Advanced communication capabilities
- Standard and secure communication protocols
- High-speed Peer-to-Peer (P2P) communications to exchange information among multiple nodes
- Protocol conversions
- Secure Communication Bridge for information exchange with a utility enterprise network (optional).



PICTURED: SIMPLE solution architecture

Benefits

- Improved distribution system visibility and reliability
- Enhanced operational capabilities
- Integration into the existing feeder equipment and distribution automation schemes.
- Accommodation of high DER penetration
- Deployment of multiple distribution automation applications due to advanced computation capability
- Integrated protection and control solution (advanced protection schemes).

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Specifications

Voltage and Current Input

- Rated frequency: 50 Hz or 60 Hz
- Three-phase current and voltage (low-energy analog inputs)
- Three-phase optical voltage input (optional)
- Output contact type: Form C
- Number of output contacts: 2.

Environment

- Operating temperature: -40 °C to +70 °C
- Storage temperature: -40 °C to +85 °C
- Humidity: 95% non-condensing.

Communications Protocols

- OpenFMB (DDS)
- Sample value (IEC 61850-9-2 and IEC61869-9)
- Synchrophasor measurement (C37.118)
- DNP3.0 (IEEE 1815)
- Modbus.

Radio Standard

- Frequency: 5,150-5,850 MHz
- Transmit power: 21-36 dBm
- Modulation: 802.11a/n - OFDM
- Power consumption: 4 W typical
- Field-area meshed communication.

Standards

- IEEE C37.118.1/2-2011: Standard for synchrophasor measurements and data transfer for power systems
- IEEE 2030.5-2018: Standard for smart energy profile application protocol
- IEC 61850: Standard for communication networks and systems for power utility automation
- EC 61869-6: Instruments transformers – Part 6: Additional general requirements for low-power instrument transformers
- IEEE 802.11a: Standard for transmitting data over a wireless network.

Applications

SIMPLE Automated Resource Control

- Smart inverter settings and functions
- Feeder load management and self healing
- Voltage profile management
- DER monitoring, aggregation and controls.

SIMPLE Microgrid Control

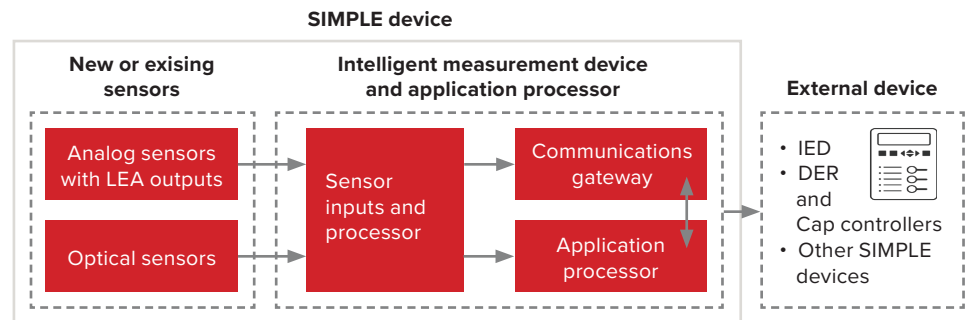
- Coordinated distributed control of feeder-level devices, load centers, and DERs
- Front- and behind-the meter communication gateway.

Advanced protection schemes for distribution systems with DER

- Falling conductor protection
- Communication-enhanced coordination.



PICTURED: A SIMPLE device installed on a distribution pole along with radio



PICTURED: A SIMPLE solution block diagram

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