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SGW1050

Digital Grid Solutions - Substation Gateway for the smart distribution grid

Siemens PLC-based end-to-end AMI solution comprising in addition

- EnergyIP MDM meter data management system
- UDIS head end system
- IM150 and IM350 meters, as well as further 3rd party G3-PLC meters

PLC-based Advanced Metering Infrastructure (AMI)

In a Power Line Communication (PLC) based AMI architecture, a series of smart meters is connected via the low voltage power line to aggregation devices like gateways or data concentrators. Typically located within distribution substations/ ring main units, they provide aggregated communication from the smart PLC meters to the Head End System (HES) and onwards to the Meter Data Management System (MDMS). Whereas traditional data concentrators include (intermediate) storage of the meter data, gateways transparently and securely tunnel the meter data on their way to the HES.

Standard, state-of-the-art interfaces

The Siemens SGW1050 provides field area network (FAN) or access communication through G3-PLC™, a highly-reliable, high-speed, long-range communication over the existing low voltage power line grid. G3-PLC is designed for interoperability and has been adopted by a broad range of utility companies, semiconductor and equipment manufacturers and system integrators within the smart grid ecosystem.

The wide area network (WAN) or backhaul connectivity is provided by an Ethernet-WAN port for connection to an existing communication infrastructure or an external modem. In addition, SGW1050 can optionally also be equipped with an integrated cellular modem.

SGW1050 can be configured centrally through HES or simply with a standard web browser at the service laptop connected via the Ethernet service interface.

Cyber security by design

SGW1050 provides security features including a processor with Cryptographic Acceleration and Assurance Module (CAAM) and Secure Non-Volatile Storage (SNVS), PKI- / certificates-based authentication and authorization, interface-bound role-based access (RBAC), TLS end-to-end security for remote and local access, transparent transport of encrypted meter data, PLC MAC-Layer Security, application-based blacklisting of end points, firmware integrity protection, security logging.

Powerful element in E2E AMI

Based on a future-proof hardware and software platform, the SGW1050 provides a seamless fit within a

Convergence of AMI and Smart Grid

The powerful communication means of SGW1050 extend its applicability beyond AMI purposes. Beside the G3-PLC interface towards smart meters and also further smart nodes within the low voltage grid, it offers an additional local Ethernet port. Intelligent nodes for grid monitoring and grid control located in the distribution substation / ring main unit can thus easily be connected towards distribution SCADA or cloud systems.

SGW1050 distribution grid Substation Gateway - Technical specifications

Power supply

- 3x 220-240/380-415VAC, 50 Hz
- Power and system status LED, as well as status LEDs for the communication interfaces

Housing

- Plastic housing with DIN rail or three-point mounting
- Dimensions: 144 x 184 x 69 mm (W x H x D)
- Protection class: IP52
- Cover manipulation detection

Environmental Conditions

- Operation temperature range: from -20°C to +60°C
- Electromagnetic Compatibility: IEC 60870-2-1, IEC 60255-22, IEC 61000-4, EN 50065-2-3

Clock

- Real time clock, buffered, external time synchronization via NTP (Network Time Protocol)

Communication Interfaces

Neighborhood Area Network (NAN) / Access:

- G3-PLC (ITU-T Rec. G.9903) power line communication, PAN coordinator function
- 3-phase signal coupling with automatic phase selection
- automatic adaption of the receiver dynamic range
- either CENELEC A (35 - 91 kHz) or FCC (150 - 490 kHz) band plans

Wide Area Network (WAN) / Backhaul:

- 1x Electrical RJ45 Ethernet (ETH) 10/100BASE-TX as WAN port; applicable to all subsequent variants
- WAN variant "A": ETH-WAN only
- WAN variant "C": ETH-WAN and cellular: 4G / LTE Cat 4, 3G UMTS / HSPA and 2G/GPRS/EDGE; for details see page 3

Local Area Network (LAN)

- 1x Electrical RJ45 Ethernet 10/100BASE-TX as local maintenance / service port
- 1x Electrical RJ45 Ethernet 10/100BASE-TX as local smart grid device port
- Integrated Managed-Ethernet switch with port-based VLAN
- Integrated web server for configuration and diagnostics

Protocol Support

- HTTPS, TLS, SNMPv3, NTP
- DLMS/COSEM (IEC 62056) for smart meter communication
- Modbus-TCP*
- OPC UA Pub Sub*

* separate firmware to be installed

Certifications / Approvals

- CE Declaration of Conformity
- RoHS, WEEE
- RED Europe (cellular WAN variant)
- G3-PLC Alliance Certifications (2018)

Cellular WAN variant details:

- WAN variant "C":
  ETH-WAN and cellular:
  4G / LTE Cat 4 acc. to 3GPP Rel. 9,
  3G UMTS / HSPA and
  2G/GPRS/EDGE acc. to 3GPP Rel. 8;
  frequency details:
  - LTE frequency bands: 800, 850, 900, 1800, 2100, 2600 MHz
  - UMTS frequency bands: 850, 900, 1900, 2100 MHz
  - GPRS/EDGE frequency bands: 850, 900, 1800, 1900 MHz
  - 2x SMA (f) connectors for external antenna (2x2 MIMO, 50 Ohm)

General cellular WAN properties:

- 1x SIM card slot (2FF format)
- GPRS/EDGE multi-slot class 12

Zero-touch provisioning / plug & work

SGW1050 will be delivered for zero-touch / plug & work provisioning in the field.

Personalization of the device during manufacturing includes:

- customer crypto-credentials like PKI Root-CA-Certificate
- customer network configuration for access to provisioning environment
- customer-provided identification means, e.g. 2D barcode
- customer-provided SIM cards incl. APN / RADIUS authentication credentials (for cellular WAN variant)

Electronic companion and shipment file processes assure cyber-secure transmission of personalization data into manufacturing as well as device reference data from manufacturing respectively.

Security information

Siemens provides products and solutions with grid security functions that support the secure operation of grids, networks and solutions. They are important components in a holistic grid security concept. With this in mind, Siemens products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates. For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art grid security concept. Third-party products that may be in use should also be considered. For more information about grid security, visit https://www.siemens.com/gridsecurity

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (www.openssl.org), cryptographic software written by Eric Young (eay@cryptsoft.com) and software developed by Bodo Moeller.

Siemens AG
Smart Infrastructure
Digital Grid
Humboldtstraße 59
90459 Nuremberg, Germany

Customer Support:
http://www.siemens.com/csc