Distribution Monitoring
with the Landis+Gyr S4x Meter

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The Landis+Gyr S4x polyphase meter is providing value to utilities beyond commercial and industrial metering applications.

With built-in sensing and communication capabilities, the S4x polyphase meter is an ideal candidate for performing tasks reserved for distribution sensors. In fact, utilities are finding it useful for distribution feeder and transformer monitoring.

The S4x meter can be equipped with a DNP Enablement application that allows meter data to be retrieved using ANSI C12.19 protocol and translated into DNP3 protocol for delivery to a utility DNP host application like SCADA. This use as a grid-edge monitor turns the S4x into a cost-effective distribution sensor that can be used by operations for load balancing, power quality control, distributed energy resource management and volt/var use cases.

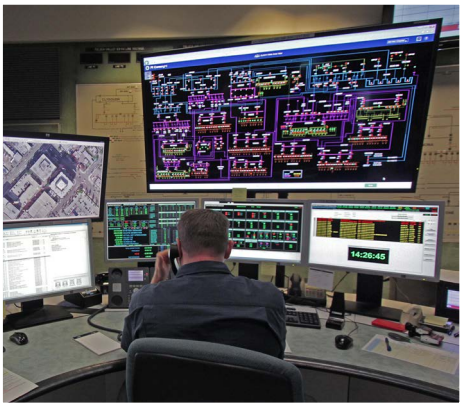
The wealth and granularity of data that can be collected also provides utility planners with insights into historic feeder performance to aid in grid modernization planning.

Use Case Examples

Installing S4x meters inside a substation provides power quality and load sensing to all three phases of a feeder. Utilities that purchase power can use this approach for real time monitoring of energy being delivered and loading that can help utilities apply demand reduction and/or switching to minimize demand charges. Installing S4x meters down line at any service transformer is an effective way to measure voltage for volt/var solutions.

Theory of Operation

The DNP Enablement application provided by Landis+Gyr reads Standard ANSI table 23, which reports cumulative energy registers, and Manufacturer ANSI table 8 that provides data from instantaneous registers. The tables below contain additional detail on data provided with the standard application version. The time intervals along with other data can be customized for each utility. The S4x DNP Enablement application supports and, in fact, prefers unsolicited "report-by-exception" as the method to deliver the meter data to the host, but also responds to polling requests. The last five bits of the geographic coordinates of the radio become the DNP3 ID. Once the application is active, it will initiate the process to read the ANSI tables from the S4x meter and build the DNP3 data objects. The application requires a poll from the collecting radio to learn the network address, as well as the DNP3 host address of the system. Once the network address is known, unsolicited DNP3 messages will begin to be sent to the utility DNP host application. DNP3 read poll requests receive a response containing all DNP3 objects. The response is an unknown function message for unsupported function codes. The standard DNP3 data is shown below:



Binary Points – Object 01 Variation 02		
Point 0	Meter Communication	1 = On, 0 = Off
Point 1	Analog Channel	1 = On, 0 = Off
Point 2	Counter Channel	1 = On, 0 = Off
Point 3	Unsolicited Reporting	1 = On, 0 = Off
Counter Points – Object 20 Variation 01		
Point 0	KWH Delivered	0 - 4294967295
Point 1	KWH Received	0 - 4294967295
Point 2	KVAH	0 - 4294967295
Point 3	KVARH Lead	0 - 4294967295
Point 4	KVARH Lag	0 - 4294967295
Analog Points – Object 30 Variation 02		
Point 0	Amps – Neutral	XX.XXX – Note 1
Point 1	Amps – A Phase	XX.XXX
Point 2	Amps – B Phase	XX.XXX
Point 3	Amps – C Phase	XX.XXX
Point 4	Volts – A Phase	XXX.XX – Note 2
Point 5	Volts – B Phase	XXX.XX
Point 6	Volts – C Phase	XXX.XX
Point 7	Power Factor	X.XXXX – Note 3
Point 8	VAR	XXXXX – Note 4
Point 9	VA – RMS	XXXXX
Point 10	VA	XXXXX
Point 11	Watts	XXXXX

*Note 1 – Value is delivered as up to 5 digits with an implied decimal point at 3 decimal places.
*Note 2 – Value is delivered as up to 5 digits with an implied decimal point at 2 decimal places.
*Note 3 – Value is delivered as up to 5 digits with an implied decimal point at 4 decimal places.
*Note 4 – Value is delivered as up to 5 digits with no implied decimal point.

Conclusion

Landis+Gyr's suite of grid-edge applications are applicable beyond traditional DA devices. The DNP Enablement app for the S4x demonstrates how utilities can tap the native intelligence of Landis+Gyr's RF Mesh meters to perform multiple functions. Offering many turnkey deployment options and use cases, the S4x's value as a distribution monitor and sensor compares very favorably in both cost and performance to other options available.

To talk to a Landis+Gyr industry expert contact Kent Hedrick at **kent.hedrick@landisgyr.com**

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