OSGP OVERVIEW

Larry Colton, Mark Ossel

1. OSGP ALLIANCE
   mark.ossel@osgp.org

ABSTRACT

This document describes OSGP, Open Smart Grid Protocol, one of the most used modern protocols for smart grid applications, like smart metering. The system approach, hardware and software, based on the OSGP published standard has been adopted in many countries and by many utilities in Europe.

ÖZETÇE

Bu belge akıllı ölçüm gibi, akıllı şebeke uygulamalarında en çok kullanılan modern protokollerden biri olan OSPG'yi (Açık Akıllı Şebeke Protokolü) tanıtıyor. OSPG'nin yayınlanan standartlarına dayalı sistem yaklaşımı, donanım ve yazılım birçok ülkede, çoğunlukla da Avrupa'da benimsendi.

What is OSGP?

The Open Smart Grid Protocol (OSGP) is targeted at utilities that want a multi-application Smart Grid infrastructure instead of a meter centric Automated Metering Infrastructure (AMI). OSGP is not just applicable for meters; it's for a variety of smart grid devices. Energy Service Network Association (ESNA), a non-profit corporation composed of utilities, manufacturers, and integrators, is responsible for promoting the adoption of OSGP, supporting the publishing and maintaining of the OSGP standards, as well as supporting the certification process of OSGP compliant devices.

OSGP Based Architecture Systems

The OSGP application specification, ETSI GS OSG 001, is available from European Telecommunications Standards Institute (ETSI). ETSI produces globally-applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, power line, and internet technologies. In addition, CENELEC TC 13 is currently working on a NWIP based on OSGP. ETSI and CENELEC are officially recognized by the European Union as European Standards Organizations.

As an open standard without any licensing or intellectual property encumbrances, OSGP enables:

Development of interoperable smart meters and other smart grid devices by multiple vendors

Secure platform for smart metering and smart grid applications

A large selection of smart grid products for utilities

OSGP provides secure, scalable control networking services for any device connected to the low-voltage grid. It also supplies critical information about the health of the distribution line itself, which further improves reliability and lowers operating costs for utilities and network operators.

At the Physical Layer, OSGP currently uses ETSI TS 103 908 as its power line communication standard; however the OSGP application layer is independent of the physical layer, so it is not tied to a specific communications medium.

For the Networking Layer, OSGP uses ISO/IEC14908-1.

For the data model, OSGP adapts the IEEE 1377 and the ANSI C 12 table structure for a networking protocol, not just for meters but for other utility related devices as well and adds extensions for security, authentication, and encryption.

The protocol supports the following capabilities:

End-to-end device communications & control

Three tier architecture for decentralized applications

Multi-vendor, multi-device interoperability

Reliable communications (highest reliability in the industry, > 99.8%)

Automatic topology management, meaning that OSGP-based systems automatically discover the power line topology, automatically discover meters and other devices connected to the power line, and can report this information back to the utility data center.

Rich power-quality data to enable sophisticated smart grid applications.

Secure firmware upgrades over the network.

Non-meter devices can use the OSGP infrastructure to communicate with the utility's enterprise software. This makes the meter and other OSGP device data available to new smart grid applications.

Advantages of OSGP

OSGP is proven to be interoperable because it is not meant to be customized by each vendor. Today there are more than 4 million smart meters installed and operating that are based on OSGP, at some of the largest and most advanced smart metering projects ever implemented. For instance, in Sweden, Vattenfall and E.ON deployed more than one million OSGP compliant meters and have benefitted from superior performance and reliability of OSGP. In Denmark, more than 800,000 OSGP compliant meters have been deployed by a number of utilities including SEAS/NVE, NRGi, and EnergyMIDT. These smart meters like others in OSGP deployments, report not just hourly readings, but provide extended load profile data, power quality reports, and integration with home energy networks with perfect daily performance of every meter between of between 99.8 and 100%.

OSGP started with a networked design for all of the smart grid devices on the edge. In contrast, DLMS was designed for automatic meter reading. By the way, OSGP's open network and standards philosophy could expand in the future to incorporate the integration and interworking with DLMS/COSEM devices, something that DLMS is not prepared to support. OSGP is rapidly gaining more visibility

with an ever growing ecosystem of industry vendors offering OSGP compliant products to utilities on all continents.

OSGP Vendors

OSGP is supported by a variety of meter and smart grid device suppliers that offer or plan to offer solutions compliant with the standard including Echelon Corporation, Mitsubishi Electric, Korea's VIDCOM, Malaysia's Comintel, China's Holley Metering, Brazil's ELO, Germany's Diehl, Austria's Ubitronix and Germany's Gorlitz.

System Overview

The OSGP based NES Systems is the world's leading solution for a utility's smart metering and AMI needs. As a grid solution, it's designed to meet today's smart metering needs and support tomorrow's service demands. Built on the success of the world's first and largest AMI project (30 million homes), the NES System has changed the global landscape for smart metering. With the NES System, smart metering and AMI systems are no longer focusing on the meter, but on an energy network for a smarter grid. A conceptual view of the NES system is shown below.
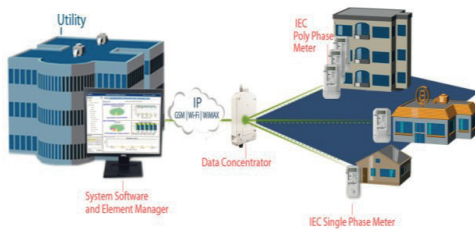
Components of the NES System

The three components of the NES System — smart meters , IP meters/data concentrators, and system software — are designed to leverage each other to increase the overall power of the system, balance the intelligence of the system at the points where value is highest, and provide the highest level of reliability and performance with the lowest cost of ownership.

NES System Software

NES System Software makes integrating with new and existing enterprise applications via IT standards fast and easy. This Service-Oriented Architecture (SOA) software has been proven in numerous utility deployments.

NES Data Concentrators

These intelligent infrastructure devices let a utility leverage its NES System solution beyond AMI or smart metering. The concentrators provide a power line mesh to ensure 100% meter communications, isolate and pinpoint outage and other service issues, and minimize wide-area communications costs. They communicate with System Software located at a utility's service center over any IP-based backhaul.

NES Smart Meters

NES smart meters meet the future market and regulatory needs of a utility by incorporating a rich set of features including prepay, multi-tariff abilities, remote updates, remote connect and reconnect, tamper and outage detection, hardware extensibility, direct relay control, software-settable service levels, and load factor monitoring. Meters can be updated with new pricing, quality of service, energy management, and monitoring and control services even after they've been fully deployed.

NES System Management

The NES Element Manager is the Web-based network manager for the NES System. A real-time visual dashboard, it speeds system installation and provides summary and detailed views of system health and status to streamline operations and maintenance. The easy-to-use interface lets system administrators configure and manage a single meter or millions of meters, making it ideal for both pilot installations and full-scale system deployments. The Element Manager integrates seamlessly with existing NES systems and is transparent to other applications. It manages the full lifecycle of NES meters and data concentrators including installation, configuration, performance monitoring, and diagnostics.

Benefits of the NES System

•	Maximizes grid intelligence while minimizing operating costs by embedding communications and monitoring directly into the electricity grid.

•	Creates an open environment for competitive services to adapt, modify, and extend their energy and metering services, using market-leading software, hardware, and service providers.

•	Eliminates risk by freeing a utility to focus on its primary network asset — the electricity grid— by leveraging established, IP-based backhaul communications providers regardless of technology.

•	Delivers certainty that the system will perform to customers' and stakeholders' expectations through a history of reliability, performance, and cost savings provided to tens of millions of homes.