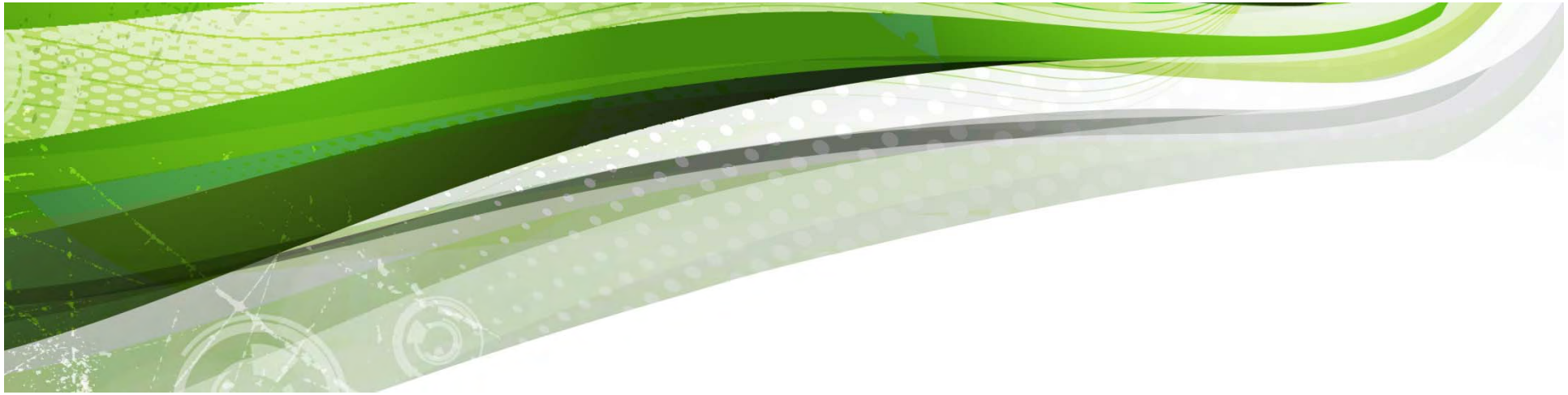
OSGP - Open Smart Grid Protocol

Inter-operability
Security issues (quick scan)
Conformance Testing



Agenda

13:00	Registration
13:15	Welcome and introduction to OSGP
13:30	The Open Smart Grid Protocol (OSGP) and its environment; Smart Metering and beyond; the future is about Smart Grids; Vision behind OSGP
13:45	OSGP support and development; The Energy Service Network Association (ESNA); Sharing the knowledge and experience; what it will bring you
14:00	OSGP main concepts, part I; The operational and functional overview of OSGP
15:00	Coffee / Tea break
15:30	OSGP main concepts, part II; Interoperability with other Standards and Protocols; MEP, M-bus, OSGP-DLMS/COSEM functionality (including demonstration)
16:15	OSGP Information Security and Data Protection (Quick Scan)
16:30	OSGP conformance testing and inter-operability testing
17:00	Questions and Answers
17:30	End of Program

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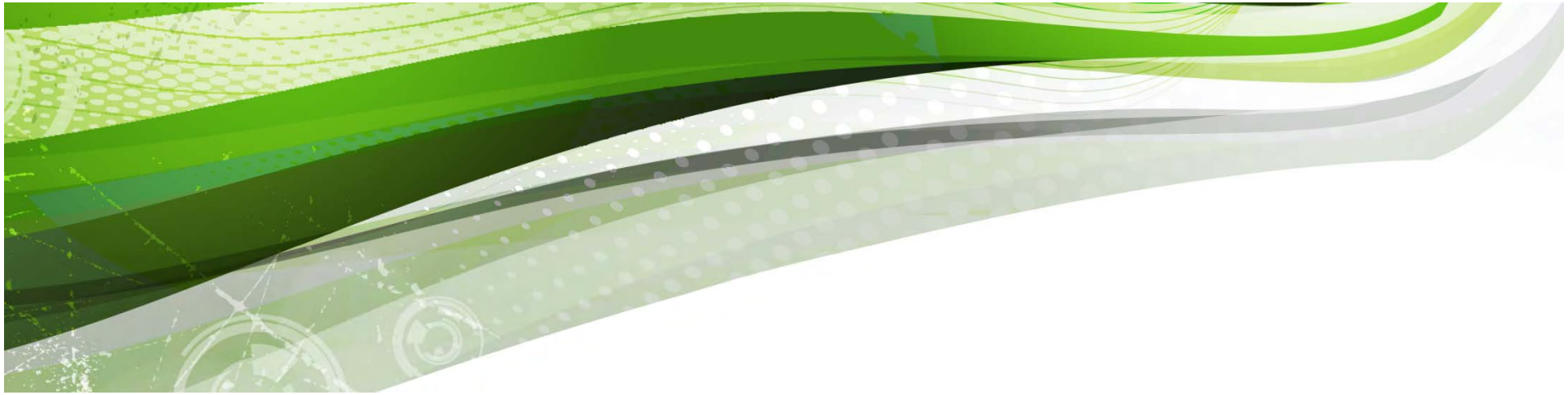
Inter-operability at different levels

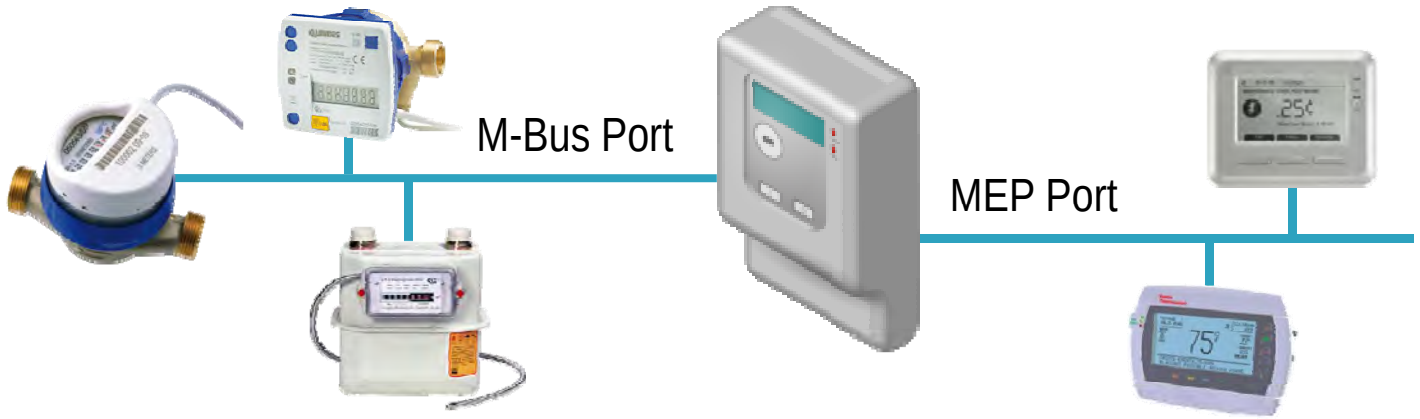


Inter-operability at different levels

- Where systems meet – “The interfaces”
- Head-end of Utility
- Data-concentrator (regional)
- OSGP devices including OSGP Smart Meters (local)

Overview M-Bus and MEP

- OSGP devices can contain optional communication ports, such as:
  - M-Bus Port :
    - Allows connection of up to four M-Bus devices such as gas, water or heat meters
    - OSGP device stores consumption data collected from M-Bus devices along with any alarm or status messages
    - Data and messages are sent to utility central service center through network
  - MEP - Multipurpose Expansion Port:
    - Serial communication port to provide access to the meter's data
    - Bi-directional port at the meter board level
    - Third parties can develop external MEP devices that interface to the meter



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M-Bus Port

- OSGP device performs functionality of M-Bus, according EN 13757-2 and -3
- Billing data collected during scheduled polling (configurable interval) of M-Bus devices or by on-demand read request
  - Scheduled read can be set to repeat daily, weekly, monthly or yearly
  - Stored as received from M-Bus device
  - Store up to a configurable number of data sets, being previous scheduled read data for all M-Bus devices combined

- OSGP can recognize M-Bus alarms and status messages, such as:
  - type of counter,
  - power level,
  - permanent and temporary errors

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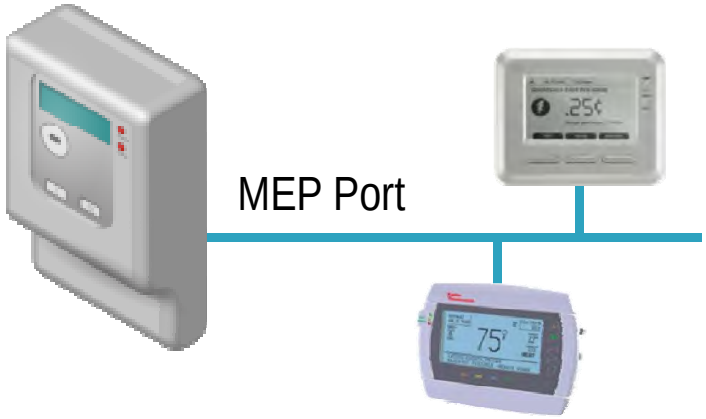
MEP - Multipurpose Expansion Port

- MEP provides a secure entry point to OSGP through meter for
  - **Access to real-time and historical data** collected by meter
  - **Control and monitoring of in-home devices** from utility server
  - Extension of OSGP technology to **legacy devices**
- MEP devices typically outside meter but may be internal, powered by meter
- OSGP treats MEP interface as single device with **MEP device as Master**
- Expansion and control of MEP network beyond OSGP managed by MEP device
  Considerations for controlling a network beyond meter include:
  - Binding wireless devices to meter
  - Managing dispatch of OSGP requests to appropriate end device
  - Buffering requests and data for end devices that are not always on



OSGP to MEP Device Communication

- Implemented via **two different mechanisms**, depending on the urgency and need for acknowledgment of the data transfer
- Non-Urgent Data
  - MEP device checks for new data every time it communicates with OSGP device and **at periodic interval**. Data is not managed or cleared by OSGP
  - Non-urgent data transfers to MEP device
- Urgent (On-Demand) Data
  - Data transfer that is to occur **as soon as possible**, usually with expectation of acknowledgment of success or failure of transfer
  - Downlink data transfers and **on-demand write requests to MEP device**

Example MEP Applications

- Bi-directional communication with In-Home-Display (IHD)
  - Format and send data from meter
  - Forward pricing signals, energy alerts and messages
  - Retrieve customer overrides and send to meter

- Control Communicating Programmable Thermostat (CPT)
  - Change temperature set point based on tariff
  - Load profile home temperature and set point
  - Change set point on-demand
  - Forward pricing signals, energy alerts and messages to status lines
  - Retrieve customer overrides and send to meter

- Connect existing non-communicating meter (gas, water, etc.) to OSGP

OSGP Smart Meters are MEP Enabled for all kind of Applications - Future-proof, Secure and Inter-operable

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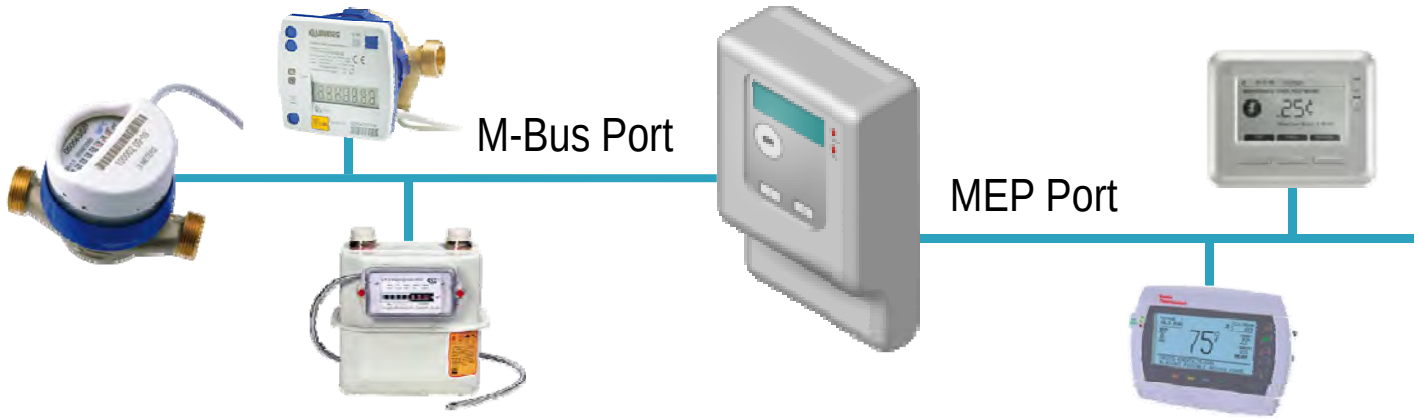
M-Bus or MEP?

- M-Bus recommended for reading gas, water and heat meters:
  - When Water meters conform to M-Bus standard
  - OSGP Meter is master and can read M-Bus devices as scheduled
  - Proven solution requiring no additional software or hardware development
- MEP is recommended where flexibility is required:
  - Meter connected to a RF card that talks to in-home displays
  - Where meter protocols are not standardized

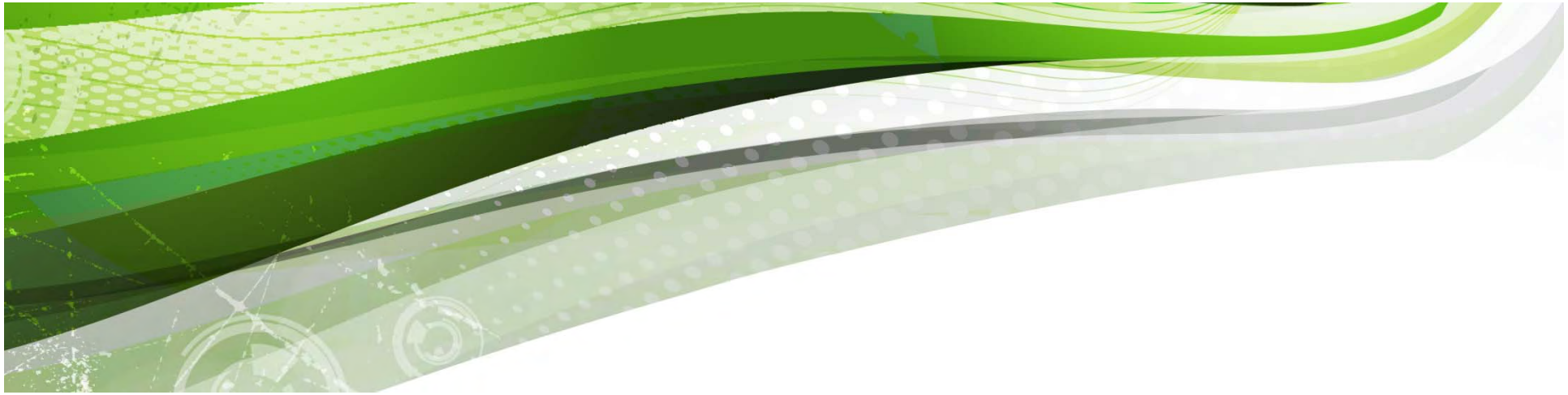


OSGP-DLMS/COSEM Interoperability

- Presentation by GuruX

Security “Risks and Measures”

Access Control
Authentication
Encryption



Overview

- The head-end security features
- Security keys and key management
- Protocols over Secured Interfaces
- Secure firmware updates
- Business Processes implementing the Security Policy
- Conclusion

Utility Networks Must Be Secure

- Every operation requires some level of security
  - There should be no unsecured interfaces or access to the system

- Secrecy is *NOT* Security
  - “Secrets” are not secure over time
  - Multi-year deployments, multi-utility deployments
  - Many people involved — trust no one
  - Information and software is easily shared on the Internet

- Security must protect Privacy as well as Access

Security is End-to-end and Comprehensive

- Everything is secured
  - No manufacturing “back doors” around security
  - Devices are always in a secured state
  - All interaction with devices is secured
- Security begins in the factory
- Security is multi-layer
- Keys are random
  - For example, knowing the unique key of one meter gives you no information for finding the unique key for another meter
- Unique keys NEVER have to be distributed to field employees

Multi-layer Security

- Devices are always in a secure state
  - Utility-unique security and device-unique security
- Utility-unique security - the state after manufacture
  - Secured with a unique utility-specific key
    - Common to all the utility's meters; different from all other utilities
  - Limited access to device functions (for example, no firmware download allowed)
  - Used to access devices the first time for provisioning
  - Once disabled, devices cannot be modified using this key; instead the unique key must be known and used to access the device
  - Typically, if devices are shipped pre-provisioned, they will be set to leave the factory with device-unique security enabled

Multi-layer Security

- Device unique security - the state after provisioning
- Unique keys are randomly generated at manufacture time
- Knowing the unique key of one device gives you no information for determining the unique key of another device
- The system installation process is designed such that these keys NEVER have to be exposed to human beings
  - They can be transferred between software and never exposed to human being
  - They can remain encrypted and safe in the utility's IT systems

Security – Protocols

- All transfers within OSGP are encrypted and authenticated
  - Encrypted with high speed stream cipher
  - 8 byte digest appended to each message to authenticate sender
  - Details in OSGP specification
- Every request and response is signed with a digest to verify its source
- Authentication keys are updated using increments; they are NEVER sent in the clear

Recommended Key Protection Mechanisms

Security Begins in the Factory

- At manufacture time:
  - Keys and passwords generated by manufacturing test machines
  - Stored in an encrypted database
  - Factory employees do not have access to database
- At shipment time:
  - Manufacturing software creates an encrypted file containing the serial numbers of the devices along with the unique security keys and passwords
  - The decryption key for file is unique and is passed to the utility separately from the file itself

Motor behind OSGP

OSGP Conformance Testing (DNV KEMA) and Certification (ESNA)

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ESNA

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Questions and Answers

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