Standards for Smart Grids

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ETSI Board

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Standards for Smart Grids

- Why do we need Standards?
- Who is driving them?
- What Standards are needed?
- Who is producing them?
- What’s the next step?
What is a Smart Grid?

EC Smart Grids Task Force
Defines a Smart Grid as an electricity network that can intelligently integrate the actions of all users connected to it, including generators, consumers and those that do both in order to efficiently deliver sustainable, economic and secure electricity supplies.

“A smarter grid makes this transformation possible by bringing the philosophies, concepts and technologies that enabled the Internet to the utility and the electric grid”, US Dept. of Energy report on Exploring the imperative of revitalizing America’s electric infrastructure

- Smart Grids are about power
- but also: billing, eCommerce, subscription management, OAM functions, data models, connectivity and routing, access technologies, data storage, virtualization, cyber-security, …
Wide range of communications technologies for the Smart Grid

- Standards and interoperability are key
- “Best-fit” technology may vary as geographies differ

Communications technologies
- Powerline carrier (PLC)
- Broadband over powerline (BPL)
- WiMax (700 MHz)
- 900 MHz RF mesh
- Zigbee
- WiFi
- 2.4 GHz mesh wireless
- Digital subscriber line (DSL)
- Fiber optics

Example companies that implement it

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## Smart Grid Ecosystem

- A very complex eco-system
  - Nobody can do it alone -> Coordination and reuse of work are key
- Close relationship of Standardization and Regulation

<table>
<thead>
<tr>
<th>Standards Bodies</th>
<th>Influential Bodies</th>
<th>Policy &amp; Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vision &amp; Framework</strong></td>
<td>IEEE P2030, IEC Smart Grid Strategy Group</td>
<td>EC, NIST, EPRI, SG-ETP SEA, INCITS, OpenADR</td>
</tr>
<tr>
<td><strong>Service plane</strong></td>
<td>ANSI C12, IETF, Zigbee, ETSI IEC 60870, 61868-70, Cenelec</td>
<td>DLMS, OpenADR, OPC-UA,</td>
</tr>
<tr>
<td><strong>Control &amp; connectivity plane</strong></td>
<td>ANSI C12, IETF, Cenelec, IEEE 1686, 1588, IEC 61850, 62351, Zigbee, ETSI (incl. 3GPP)</td>
<td>DLMS</td>
</tr>
<tr>
<td><strong>Energy plane</strong></td>
<td>IEEE PES, 1547, C37, IEC, NERC, Cenelec</td>
<td>DNP, NEMA</td>
</tr>
</tbody>
</table>
ICT meets Power: the horizontal view

Service Plane
- Billing
- e-Commerce
- Subscription management and activation
- Business processes

Control and Connectivity plane
- OAM functions
- Protection and restoration
- Traffic engineering
- Connectivity and routing
- Virtualization
- Access technologies
- Time synchronization

Energy Plane
- Sensors
- Electric storage and interconnection
- Transmission and Distribution Power Systems, etc.

... with some vertical enablers
- Privacy
- Security
- Data models
Split of domains to identify key interfaces

- Grid domain
- Smart Metering
- In the house

Report back Information to customer
Information to Electrical SP
Demand/response

Electr. Service Provider

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EU Perspective

- "Member States should encourage the modernisation of distribution networks, such as through the introduction of smart grids, which should be built in a way that encourages decentralised generation and energy efficiency."

EU Smart Grids Task Force
Steering Committee and 3 Expert Groups
EG 1: Functionalities of Smart Grids and Smart Meters.
EG 2: Regulatory recommendations for data safety, data handling & data protection.
EG 3: Roles and responsibilities of actors involved in the deployment of Smart Grids.

Recommendations due Mid-2010

Second document expected Jan. 2011; towards an EC Mandate
EG1 view on Standards Roadmap

- Process for developing a standards roadmap

- Guiding principles
  - Reuse existing standards and learn from existing initiatives
  - Adhere and seek the development of international standards
  - Ensure and maximize collaboration and coordination among the different stakeholder organisations
  - Streamline and speed-up the development of European requirements for Smart Grids
  - Standardise applications enablers, but not applications
EU M/411 Smart Metering Mandate

- European Commission Mandate
  - Issued in March 2009 by DG TREN
  - Sent to the 3 ESO's: CEN, CENELEC and ETSI

- Main objective
  - To build standards for European smart meters, allowing interoperability and Consumer actual consumption awareness

- Time schedule:
  - March 2009 + 9 months
    - state of the art of existing standards, gap analysis, and first Work Program
  - March 2009 + 30 months
    - Develop new smart metering standards
M2M Application #1 Smart Metering

- Consumption info
- Fault details
- Threshold management
- Remote Meter reading
- Consumption management
- Pricing info
NIST and Smart Grids

- **NIST (National Institute of Standards and Technology)**
  - Provides the Coordination of Interoperability Standards in the USA
  - Adopted a three phase plan for Smart Grid Interoperability
  - Published NIST Framework and Roadmap, Release 1.0

- NIST has created a Smart Grid and Interoperability Panel (SGIP)
  - Not a Standards Developing Organization
  - Project Management of the production of the appropriate standards
  - 1600 Individual Members, 600 Organizations
  - Public Plenary Meetings
ITU Focus Group on Smart Grid

- CTO Group and Global Standards Collaboration (GSC) highlighted Smart Grid as priority area

- FG on Smart Grid will
  - Identify impacts on standards development
  - Investigate ITU-T study items
  - Familiarize ITU-T with emerging attributes of smart grid
  - Encourage collaboration between ITU-T membership and utilities/Smart Grid community
ITU FG Smart Grid Leadership

- Chairman
  - Les Brown (Lantiq, Germany)

- Vice Chairmen
  - Hyoungsoo Kim (Korea Telecom, Korea)
  - Haihua Li (MIIT, China)
  - Yoshito Sakurai (Hitachi, Japan)
  - David Su (NIST, USA)
ITU FG Smart Grid Collaboration

- Focus on ITU-T strengths: ICT standardization
- Avoid duplication of effort
- ITU-T management in talks with NIST, IEEE, IEC...
- More than 25 related organizations invited to the first meeting
ITU FG Smart Grid
First meeting

- Date: 14 – 16 June 2010
- Place: ITU, Geneva, Switzerland
- Further information:
  - www.itu.int/ITU-T/focusgroups/smart/
- Contact:
  - tsbfgsmart@itu.int
ITU FG Smart Grid
First meeting

- 48 people participated
- 27 input documents
- Participation from IEC, NIST/SGIP, IEEE-SA, ETSI and ZigBee Alliance with inputs
- Initial study issues list was created
- Will progress collaboration with relevant organizations including utility providers
Next meeting

- Date: 2 – 5 August 2010
- Place: ITU, Geneva, Switzerland
- Further information:
  - www.itu.int/ITU-T/focusgroups/smart/
- Contact:
  - tsbfgsmart@itu.int