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Regulatory Approaches to Smart Grid

Interoperability Standards

Sunny Rai

May 16th, 2012 Quebec City

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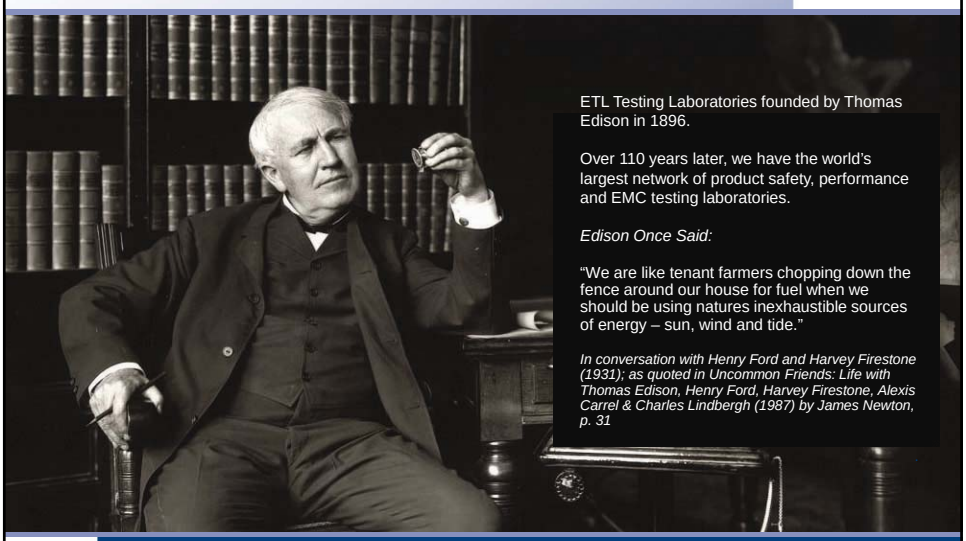
It All Began With Thomas Edison…



ETL Testing Laboratories founded by Thomas Edison in 1896.

Over 110 years later, we have the world's largest network of product safety, performance and EMC testing laboratories.

Edison Once Said:

"We are like tenant farmers chopping down the fence around our house for fuel when we should be using natures inexhaustible sources of energy – sun, wind and tide."

In conversation with Henry Ford and Harvey Firestone (1931); as quoted in Uncommon Friends: Life with Thomas Edison, Henry Ford, Harvey Firestone, Alexis Carrel & Charles Lindbergh (1987) by James Newton, p. 31

An Extensive Global Network

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More than
1,000
Laboratories and Offices

Over
35,000
People

More than
100
Countries

- FTSE 100 Company in the Support Services Sector
- Market capitalization at £3.48 billion
- Revenue generation of over £1.74 billion in 2011

Intertek Serving Your Industry and You

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Your Industry

What We Do for You

- Testing
- Inspection
- Certification
- Auditing
- Outsourcing
- Advisory
- Training
- Quality Assurance

Certification Statistics

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More than 11 billion Marks on Products

Over 1,250,000 Models Certified

65 Labs; 4 Continents

500,000+ Safety Tests

2,000+ Standards

23 Certification Products

8,400+ Manufacturers Place Their Trust in the ETL Mark

Intertek's Global Marks Include:

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ETL Listed

S Mark: Sweden

Intertek GS

Intertek QPM

BEAB Approved

ASTA Diamond

Green Certified

Building Products

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Interoperability Standards

openADR ALLIANCE

Interoperability Testing

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Testing designed to validate that components in a system work together properly

Certification, generally composed of two steps:

- Validation to a standard
- Real world interaction between products

The steps include validation of several factors including:

- Data exchange
- Data interpretation
- Communication

Interoperability

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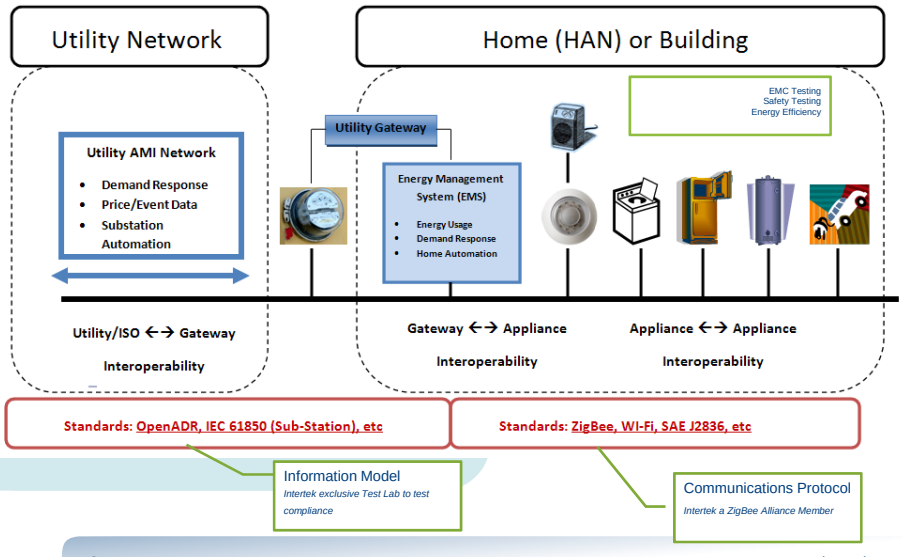

Need for Automated Demand Response

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Need to Design an Automated Demand Response protocol

- Combating proprietary solutions
- Level playing field to create best in breed for Utilities, Aggregators, and Regulators

ADR Make the grid better through:

- Automated DR
- Dynamic Pricing
- Grid Reliability

Motivation for Automated DR and Standardization

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OpenADR developed to meet automation goals from 2002

- Cost - Develop low-cost, automation infrastructure
- Technology – Evaluate reliability & readiness for common signals
- Capability - Evaluate control strategies to modify electric loads

OpenADR is a public domain standard to communicate price and reliability signals

OpenADR-based Auto-DR programs, offered by utilities/ISOs

OpenADR History

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Research initiated by LBNL/ DRRC
(California Energy Commission PIER)

Pilots and field trials
- 2003: Developments, tests
- 2004: Scaled-up tests, relay
- 2005-06: CPP/ Auto-CPP (PG&E)

OpenADR Commercialization
(PG&E, SCE, and SDG&E)

First official (v1.0) OpenADR specification by LBNL/CEC*

1. Pilots and field trials
- Wholesale markets (CAISO)
- Pacific-NW (Winter DR)
2. International demos.

2002 2003 2004 2005 2006 2007 2008 2009 2010 2011

1. OpenADR donated to OASIS and UCAlug
- UCA OpenADR Taskforce formed
- OASIS EITC formed
2. NIST Smart Grid, PAP 09
3. Honeywell Smart Grid
- ARRA 80MW Auto-DR w/ SCE

OpenADR Alliance formed

OpenADR v2.0
Intertek chosen as exclusive test house
First Ver. 2.0 Products manufactured and tested

OpenADR in a Nutshell

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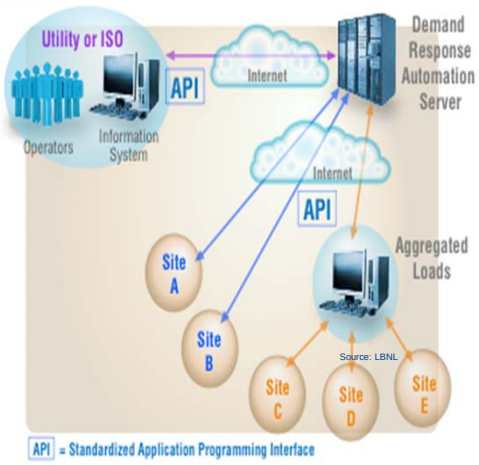
Open Automated Demand Response (OpenADR) provides a non-proprietary, open standardized DR interface that allows electricity providers to communicate DR signals directly to existing customers using a common language and existing communications such as the Internet.



Electric Grid & Demand Response

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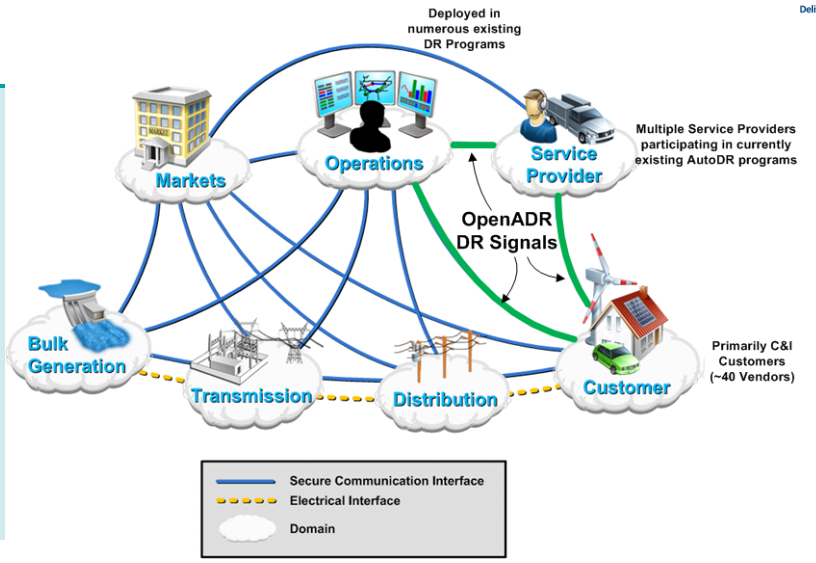

Open ADR Interoperability

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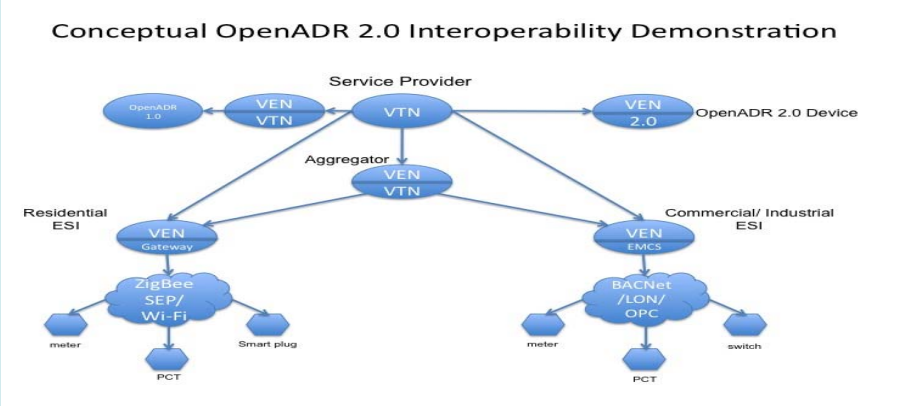

OpenADR 1.0 and 2.0

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OpenADR 1.0

- Limited number of vendors
- No certification program
- Geared towards local DR programs
- Not a national or international standard
- Limited to basic DR application

OpenADR 2.0

- Large ecosystem of vendors
- Test tool, test plan & certification
- Flexible to adjust to most DR programs
- Based on OASIS standard
- Expanded architecture to include pricing, telemetry and other services

OpenADR 2.0

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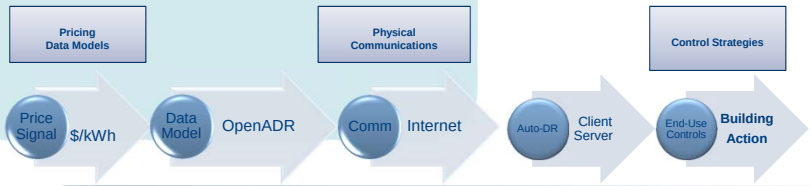
NIST Smart Grid initiative started harmonization project in 2009

Priority Action Plans (PAPs) to work on common standards for price models, schedule representation and standard DR Signals (PAP 3, 4 and 9)

OpenADR 2.0 uses the standardized output from the above efforts

Adds feedback and other price related features



OpenADR 2.0 Application

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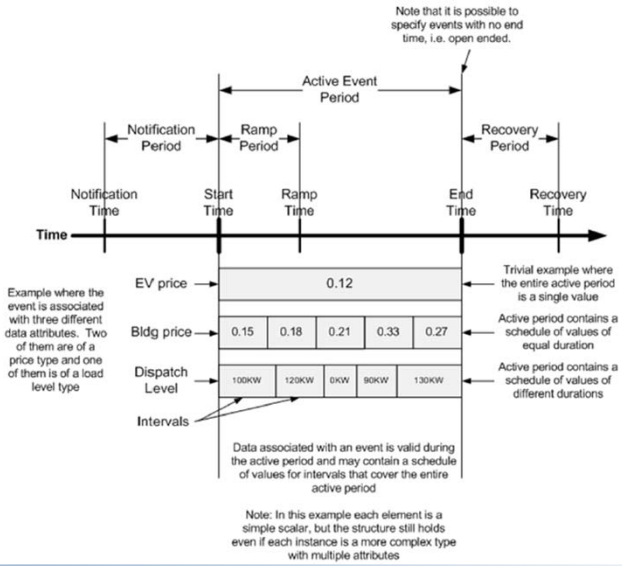

*Figure Source: OASIS Energy Interop Draft Standards (http://www.oasis-open.org/committees/energyinterop/)

Standards, Conformance & Interoperability

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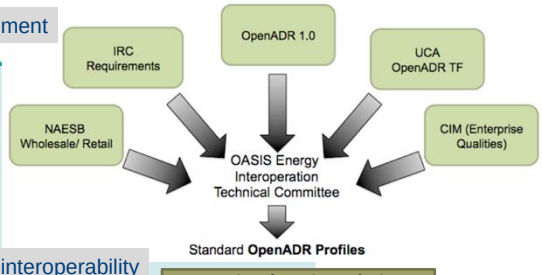
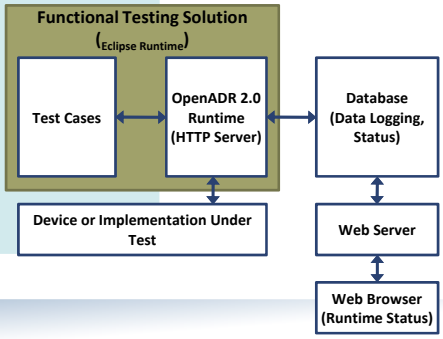
Standards development



Conformance & interoperability



Certification & Testing

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Alliance is creating
- Profile Specification
- PICS documents
- Test plan and testing
- Certification documents
- Certification test tool

Test facility and test tool validated by the Alliance

Members can obtain test tool for pretesting and do final certification testing at the test lab

Certification & Testing

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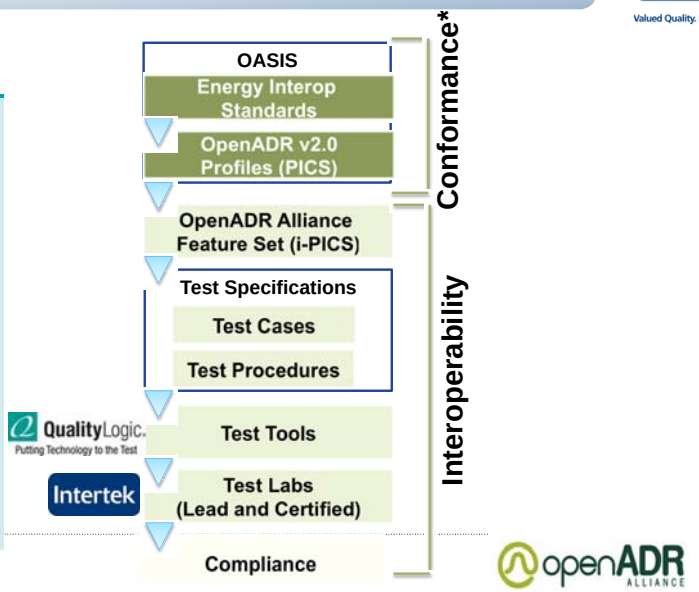

*Conformance with data models

Certification Process

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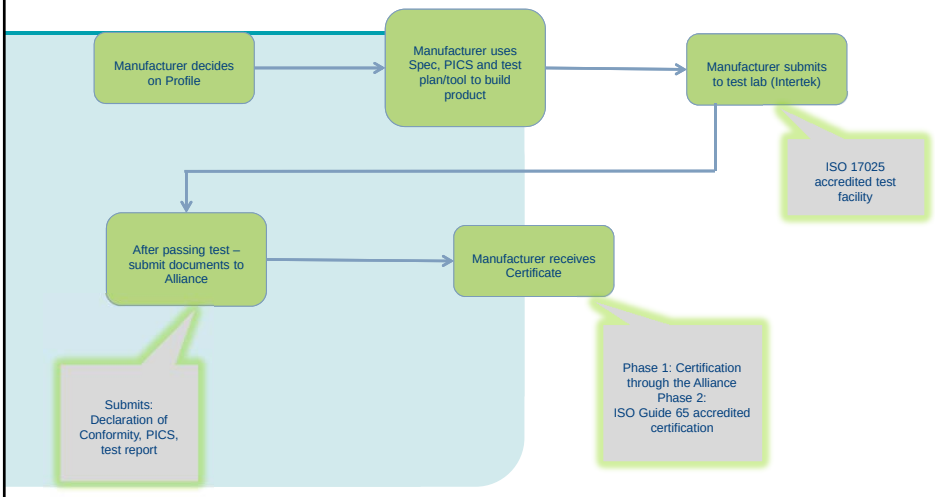

Status & Standardization

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- Simple Profile completed – OpenADR 2.0a
- Finalizing security and transport
- Test tool completed for 2.0a in two weeks
- Work continues on b and c profiles for complex devices and transactive markets (together with ISOs and RTOs)
- NIST SGIP process started to add to CoS
- Discussions started with IEC for global standardization
- Japanese Branch of OpenADR Alliance in progress

New Developments

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Working closely with the ISO/RTO Council (IRC) which intends to support 2.0. Members of the IRC include:

- AESO
- CAISO
- ERCOT
- IESO
- ISONE
- MISO
- NBSO
- NYISO
- PJM
- SPP

Significant interest in 2.0 in Japan, Korea, Australia and France.

Participate - What is the OpenADR Alliance?

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- Member-based organization comprised of a diverse set of industry stakeholders interested in fostering global OpenADR adoption
- Supports development, testing, and deployment of OpenADR technologies across a broad range of services (i.e. real time demand markets)
- Leverages Smart Grid-related standards efforts from NIST SGIP, OASIS, UCAIug and NAESB (Spell out in footnote)
- Enables stakeholders to participate in automated DR, dynamic pricing, and electricity grid reliability

OpenADR Members

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Sponsors

AutoGrid, Berkeley Lab, Honeywell, PG&E, Southern California Edison (An Edison International Company)

Contributors

ACLARA, ALSTOM, Byucksan Power, candi, Cisco, Comverge, Convergence Wireless, Digital Lumens, SDGE, KEMA, Johnson Controls, Ingersoll Rand (Inspiring Progress), ENERNOC, Sempra Energy utility, Tridium, TÜV, Intertek, QualityLogic (Putting Technology to the Test), oati, Regenenergy, Siemens, IPKeys, Lockheed Martin, SilverSpring, Tendril, wireless glue, Universal Devices

Adopters

Duke Energy, Ergon Energy, KCP&L (energizing life), NVEnergy

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Interoperability Standards

Contact Information :

Sunny Rai
Regional Vice President
Renewable Energy & Smart Grid
650 463 2950
Sunny.Rai@Intertek.com

Special Thanks:

Barry Haaser, Managing Director, OpenADR, barry@openadr.org
Rolf Bienert, Technical Director, OpenADR, rolf@openadr.org
Girish Ghatikar, LBNL gghatikar@lbl.gov

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