EPRI | ELECTRIC POWER RESEARCH INSTITUTE

Information, Communication & Cyber Security Technology Newsletter

EPRI Update on ICT Research from the Cyber Security and IntelliGrid Programs and Related Demonstrations **July 2014**

About the Newsletter

This newsletter provides a periodic update on information, communication and cyber security collaborative research at EPRI.

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Dear Information and Communication Technology Stakeholders,

We are now more than half way through the year and there are a number of exciting developments both inside and outside of the electric industry. It seems almost weekly, there is a new Internet of Things (IoT) standards activity or forum, and it is becoming increasingly important that EPRI engage the solution providers to take advantage of those innovations driven by consumer markets. It is also important to engage innovators to ensure they understand the needs of the electric industry so the commercialization of their products provides the most benefit.

To increase collaboration with solution providers and vendors, we are planning to start a new program (ICT Solution Provider Research Forum) in late 2014 or 2015 that will directly engage vendors while also coordinating with utility members of the existing IntelliGrid, ICT and Cyber Security research programs to systematically and objectively identify research needs to drive towards standardized commercialized solutions.

It is my goal to work collaboratively amidst the rapidly changing electric power environment to accelerate the commercialization of new technologies for the benefit of all. To that end, we are in the process of surveying solution providers to get their input on how this new EPRI program would be most beneficial. I encourage you to take this survey if you are a solution provider or share with your vendors and solution providers if you are a utility to ensure we get input from your suppliers.

As I was pulling together the content for this newsletter, I was impressed by the volume of research results we've produced just since the last newsletter in May. It is a credit to the direct utility engagement that is making our research possible. A majority of this newsletter is focused on sharing those recent research results and although many of our reports are only available to members, you will see that nearly half of the reports referenced are publicly available and this is important to achieve one of our goals of providing public benefits to society.

We also have some program changes coming in 2015 and the most significant are in the IntelliGrid program, with two new project sets and a program name change from "*IntelliGrid*" to *"Information and Communication Technology."* These changes are also reflective of the rapidly changing environment in which it is important to preserve legacy systems while also enabling innovation from emerging technologies such as the IoT. You can find more information on page 3 as well as here: 2015 ICT Program and 2015 Cyber Security Program.

We also have a new supplemental project on assessing licensed spectrum for utility applications (details on page 5). Utilities continue to see challenges associated with a lack of a secure and reliable communication infrastructure while adding more and more connected devices to the grid. This project is intended to assess the technical capability of potential licensed spectrum that may be available on the secondary market to help assess licensed wireless opportunities versus unlicensed frequency bands.

Lastly, I want to thank Tom O'Brien, VP-Information & Technology Services, PJM Interconnection for contributing to an article in *Electric Energy T&D Magazine* on "Data Analytics and the 'Little Data' Challenge" that will be available next week. My inspiration for this article and the topic of "Little Data" came from Bennett Gaines, CIO of FirstEnergy and chair of the EPRI ICT Council.

Enjoy!

Matt Wakefield, Director, ICCS
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EPRI's tracking and outreach efforts and associated research reflect its continued commitment to support the power industry in the identification of cyber security and privacy issues in the electricity sector. The following items highlight recent cyber security research activities with some adapted excerpts from the Security and Privacy Industry Tracking Newsletter: July 2014. For more information, contact Galen Rasche, Technical Executive and Program Manager of the Cyber Security Program, at grasche@epri.com.

The NESCOR Project is Complete! (Publicly Available), 30-Jun-2014

The National Electric Sector Cybersecurity Organization Resource (NESCOR), led by the Electric Power Research Institute (EPRI) through U.S. Department of Energy (DOE) funding, strengthens the cyber security posture of the electric sector through a broad-based public-private partnership. NESCOR served as a focal point to bring together domestic and international experts, developers, and users to address power system cyber security needs. The NESCOR program began in October 2010 and was completed in June 2014. At the completion of the project, several documents were published.

The first set of documents includes prioritized failure scenarios and impact analyses for the electric sector. The information is intended to be useful to utilities for risk assessment, planning, procurement, training, tabletop exercises, and security testing. A cyber security failure scenario is a realistic event in which the failure to maintain confidentiality, integrity, and/or availability of sector cyber assets creates a negative impact on the generation, transmission, and/or delivery of power. The base document, *Electric Sector Failure Scenarios and Impact Analyses*, was originally published in September 2013. Version 2 of the document was published in June 2014 and includes common vulnerability terminology, revisions to the common mitigations, a risk-ranking graphing methodology, and other changes proposed by users and reviewers. To support this document, NESCOR published a toolkit that utilities can use to select and assess the various failure scenarios.

Another document that was completed is the NESCOR *Guide to Vulnerability Assessment for Electric Utility Operations Systems,* V1.0. The document provides guidance on vulnerability assessments for electric utilities. The objective of a vulnerability assessment is to develop an in-depth view of a utility's security posture with a focus on system and network vulnerabilities. A vulnerability assessment can serve as a key component in assessing a utility's overall cyber security posture and the results can be used to assist in prioritizing a utility's operating plans, programs, and budgets – including determining or recommending mitigations for the utility.

All the NESCOR documents and the toolkit are available at http://smartgrid.epri.com/NESCOR.aspx

Cyber Security and Privacy Industry Tracking Newsletter (Available to Cyber Security (Program 183) Members), 10-Jul-2014

EPRI's tracking and outreach efforts reflect its continued commitment to support the power industry in the identification of cyber security and privacy issues and efforts for the electricity sector. In support of these efforts, EPRI works diligently to stay abreast of the present state of standards and guideline developments as well as regulatory governance. This newsletter provides highlights and status of ongoing efforts by numerous working groups, as well as insights into future activities. This edition of the newsletter includes:

- Upcoming Cyber Security Events
- Introduction to Two New EPRI Team Members – Ralph King and John Stewart
- EPRI DNP3 Vendor Workshop August 26-28
- Update on EPRI's Cyber Security Research Lab
- Cybersecurity Strategy of the European Union for an Open, Safe and Secure Cyberspace
- And more…

Cyber Security Procurement Methodology Training Module (Available to Cyber Security (183) Members and to others for $250), 15-May-2014

Last year EPRI published a *Framework for Grading Procurement Requirements for Power Delivery Systems* and in May 2014 a Cyber Security Procurement Methodology Training Module was published. The methodology provides guidance on applying cyber security requirements for new instrumentation and control (I&C) systems and is applicable in nuclear and fossil plants, either operating or new build. The methodology can also be used in other areas with very little tailoring. The materials are provided in two forms -- a computer-based training (CBT) module, a PowerPoint presentation with instructor notes with a study guide document.

The training module is intended for engineers, technicians, project managers, and line managers responsible for the safe and effective design, implementation, testing, operation and maintenance of digital I&C systems.

INTELLIGRID – STANDARDS, COMMUNICATIONS & ENTERPRISE ARCHITECTURE (P161)

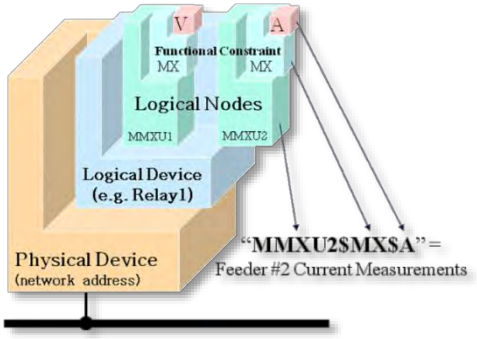
EPRI's IntelliGrid program conducts research, development and demonstrations on the information and communication technologies that enable grid modernization. Research areas include interoperability, communications, data management and analysis and smart grid implementation and planning. The following adapted excerpts are from the most recent IntelliGrid newsletter. For more information, contact Don Von Dollen, Senior Program Manager of the IntelliGrid program (dvondoll@epri.com)

2015 IntelliGrid Program Changes - Now "*Information and Communication Technology*"

As you plan your 2015 EPRI research selections, it is important to be aware that the EPRI IntelliGrid program (161) has completed an 18 month program review process that has resulted in a number of changes and improvements, including a name change to ***"Information and Communication Technology"*** (ICT), while keeping the same program number (161). The changes include adding two new project sets: 1) Enterprise Architecture, and 2) Advanced Metering Systems. We are also re-focusing existing project sets to better align research with utility staff and subject matter experts. The graphic represents the changes being made and we are also having several webcasts referenced in the "Key Dates" section of this newsletter that will provide more detailed overviews . Contact Don Von Dollen (dvondoll@epri.com) for more information.

IntelliGrid Smart Grid Interoperability Newsletter, July (Available to IntelliGrid (161) Members), 31-Jul-2014

This issue of the EPRI *Smart Grid Interoperability Newsletter* is dedicated to the IEC 61850 standard "Communication Networks and Systems for Power Utilities." This standard is a key enabler for the Smart Grid because it provides a standardized framework for the integration of Intelligent Electric Devices (microprocessor-based controllers of power system equipment such as circuit breakers, transformers and capacitor banks also referred to as IEDs) and specifies the communications requirements, functional characteristics, structure of data in devices, naming conventions for the data, how applications interact and control the devices, and how conformity to the standard should be tested.

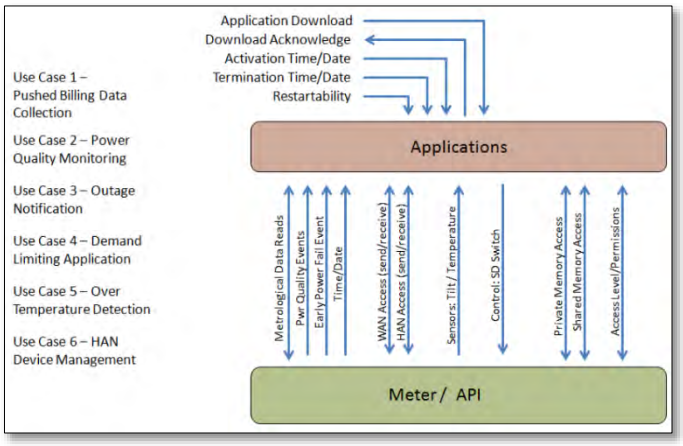


While IEC 61850 has been implemented in more than a thousand substations in dozens of countries, adoption of the standard in North America has been slow. Implementing IEC 61850 within a utility is not necessarily easy nor straightforward due to the breadth of the standard.

This newsletter describes the key features of IEC 61850; explains how it was developed and has evolved over the years; describes the implementation experience in North America; and explains the current developments..

Transforming Grid Devices into Open Application Platforms (Publicly Available), 22-Jul-2014

This report introduces the idea of utility devices becoming "platforms" rather than just "products." While a product would have fixed functionality for its service life, or functionality that only the manufacturer can update, a platform would be open to the owner, and available to perform new functions as enabled by applications (apps) that the owner may choose.



Advancements in microprocessor and software technology have made this transformation not only possible, but practical. The range of utility devices it may apply is broad, including advanced meters, communication gateways/access points, SCADA networking equipment, and distribution controls such as capacitor banks, regulators, and switches.

This report provides an update on an initiative to define and demonstrate an open application platform for advanced meters. EPRI began facilitating this initiative during 2013, working with utilities, meter manufacturers, and embedded platform providers. The project has resulted in a concept application programming interface (API) design, and demonstrable meter platforms that were independently developed by project participants. Next steps are discussed, including plans to conduct demonstrations, broaden participation, contribute the work to a formal standardization process, and continue with other smart grid devices.

***Smart Grid Communications Intelligencer*, Spring 2014** (Available to IntelliGrid (Program 161) Members), 29-May-2014

This newsletter highlights communications related research, activities and issues of relevance and interest to utility communications engineers and managers. Our focus is on developments in communication technologies and standards, and business issues that can affect the design, deployment, or operation of utility communications infrastructure. Topics highlighted in this newsletter include:

- IEEE 802.11 Wireless LAN Working Groups (802.11ah, ai, aj, ak, aq & ax)
- IEEE 802.15 Working Group – status of activities related to utility applications
- IEEE 802.21 Multicast Group management of 802.21d supporting secure distribution of keys to meters
- IEEE 802.24 Smart Grid Technical Advisory Group
- Wi-SUN Alliance – test & certification for connectivity of 802.15.4g and Interoperability of AMI
- WiMAX Forum Smart Energy Working Group and IEEE 802.16 Standards
- LTE in Unlicensed Bands
- TV White Space Technology and Standards
- Smart Energy Profile 2.0

IntelliGrid *Smart Grid Interoperability Newsletter*, April (Available to IntelliGrid (Program 161) Members), 29-Apr-2014

The IntelliGrid *Smart Grid Interoperability Newsletter* summarizes the key activities relating to interoperability within the electricity sector and provides analysis on their significance and impacts. The April 2014 newsletter reports on a workshop that brought together 12 industry thought leaders to reflect on what worked and what did not over the past five years, define key elements of an interoperability effort, and identify industry issues that would benefit from work on advanced interoperability.

COMMUNICATIONS, THE FIELD AREA NETWORK DEMONSTRATION AND SPECTRUM ASSESSMENT

EPRI's publishes "communications updates" that highlight issues of relevance to utility communications engineers and managers. The focus is on developments in communication technologies, standards and business issues that affect the design, deployment or operation of utility communications infrastructure. Much of the communications research is performed in the IntelliGrid program (161), but this section highlights research from the Field Area Network (FAN) Demonstration (Demo) and other projects outside the base IntelliGrid program. For more information, contact Tim Godfrey, Senior Program Manager, Communications at tgodfrey@epri.com.

Assessment of Licensed Communication Spectrum for Electric Utility Applications – New Project

Many utilities utilize wireless systems operating in licensed spectrum for both operational and non-operational applications on transmission and distribution systems. Several research questions arise when considering the selection of licensed spectrum for utility applications:

- What are the present and future communications requirements for transmission and distribution applications?
- Which parts of the spectrum bands best meet these requirements?
- What standards and equipment support the identified spectrum bands?
- What is the current use and availability of the identified spectrum bands?

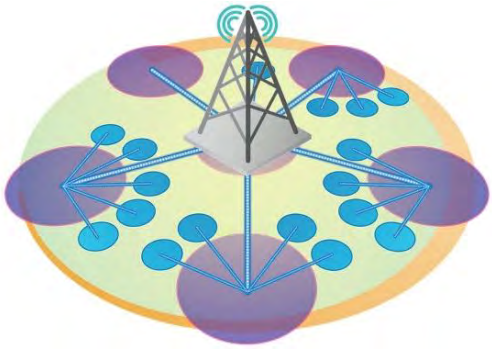
EPRI is initiating a new supplemental project to assess and evaluate licensed spectrum, in the context of the communications characteristics and requirements for present and future transmission and distribution requirements including wide area monitoring and control, distribution automation and the integration of distributed energy resources. The project will identify bands that most efficiently meet these requirements.

For more information, contact Tim Godfrey, Senior Program Manager, Communications at tgodfrey@epri.com or Scott Sternfeld, Technical Advisor, ICT, (843) 619-0050, ssternfeld@epri.com.

***Communications & Connectivity Technology Newsletter*, May 2014** (Publicly Available), 30-May-2014

This is the inaugural *Communications & Connectivity Technology Newsletter*, which highlights key insights from EPRI's innovation scouting and technology exploration in areas with potential for impact or application in the electric utility industry. The target audience is executive management in IT, telecom, and communications. This issue introduces the overall plan and context and provides detailed discussions of the utility application of "Internet of Things" (IoT). It also includes 10 major communication technology trends as the apply to the electric industry:

- Wireless Spectrum Shortage/Spectrum Sharing
- Rapid growth of wireless data use and reduction of fixed broadband subscriptions at residences
- Transition of public carrier networks to Long-Term Evolution (LTE) networks
- Transition from TDM to IP
- Cyber security threats
- Virtualization (from physical to software-defined implementation)
- Distributed, Scalable Computing
- Big Data
- IoT (Internet of Things) and IoE (Internet of Everything)
- Sensors



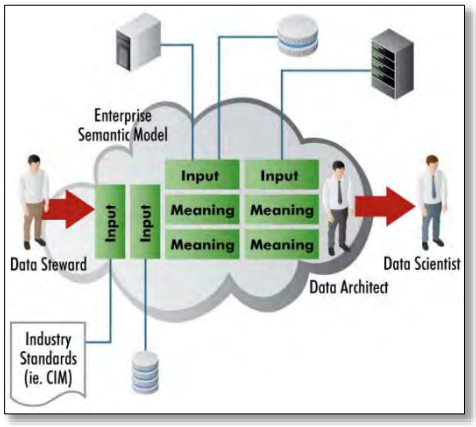
The Distribution Modernization Demonstration (DMD) and Transmission Modernization Demonstration (TMD) on data analytics is EPRI's multiyear international demonstrations as part of the Data Analytics identify and analyze data-oriented applications and support infrastructure through collaborative demonstrations around the world. For more information on the DMD, contact Doug Dorr, Program Manager for the DMD (ddorr@epri.com) or Dr. Alberto Del Rosso, Senior Project Manager for the TMD (adelrosso@epri.com).

The Electric Utility Industry's Cautious Move to the Cloud: An In-Depth Look of the Benefits and Risks (Available to Members of the DMD & TMD), 21-Jul-2014

It is becoming increasingly inefficient and expensive for utility IT departments to own, operate, and maintain all of the infrastructure and software needed to support the power-delivery business. As a result, a business model known as "cloud computing" is emerging as a new option for flexible and versatile utility IT operations. The U.S. government's National Institute of Standards and Technology (NIST) defines cloud computing as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (such as networks, servers, storage, applications, and services). This document provides a clear definition of cloud computing and explores the utility industry's cautious adoption of cloud services as well as the benefits and risks, both perceived and real. It explores best practices and lessons learned from various cloud computing initiatives. It provides utilities with the education from experts who serve the industry to help them make informed decisions about cloud computing.

Data Governance and Utility Analytics Best Practices (Available to Members of the DMD & TMD), 30-Apr-2014

The broad cross-industry approach taken by traditional IT advisory firms to perform data management activities is interesting, but it does not serve utilities particularly well because it misses the unique needs of the electric utility industry. This report describes creation of a data management model that is a synthesis of three frameworks. The analysis in this report is different from other analyses because it is utility-centric.



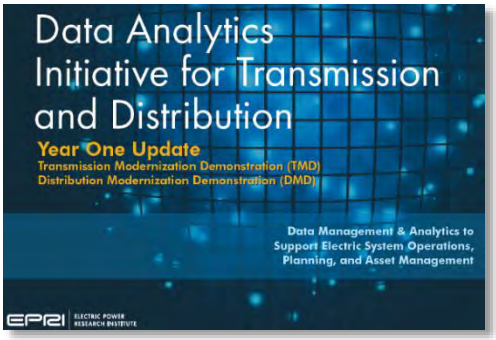
This report details the steps taken to synthesize three leading frameworks used for organizations to perform data-management activities: OpenSG Enterprise Information Management (EIM), Data Management Body of Knowledge (DMBOK), and the Method for an Integrated Knowledge Environment (MIKE2). Each framework approaches the problem in similar fashions, but each framework had emphasis in different areas. The creation of the synthesized data management model was an attempt to capture the strengths of each model.

The synthesized framework will give senior managers a powerful tool to evaluate the people, processes, and technologies in their organizations that support data management. Additionally, based on input at workshops, the DMD and TMD project have identified three roles in which utilities typically struggle -- data architects, data stewards, and data scientists. This report describes the relationships of these roles to an enterprise semantic model and the relationships that these roles have with the semantic model. The relationship suggests that the quality of the data a data scientists analyze will be limited by the stewardship, processes, infrastructure, and quality of the data available to them. It is the human equivalent of the adage "garbage in-garbage out" when it comes to information processing.

Data Analytics Initiative for Transmission and Distribution: Year One Update (Publicly Available), 24-Jun-2014

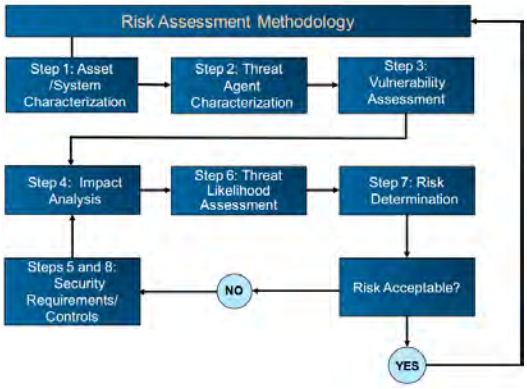
EPRI initiated the DMD & TMD projects in 2013 in response to the most pressing challenges the electricity industry is facing relative to data analytics for the grid of the future -- realizing quantifiable value from existing and emerging data sets, and defining the most effective ways to deliver this value to specific business areas.

This report provides an update on data analytics priorities from 14 utilities in the demonstration project along with a reference to recent deliverables.



Risk Assessment Methodology for Data Analytics for Transmission and Distribution (Available to Members of the DMD & TMD), 30-Apr-2014

The electricity sector has developed tools that can be used to address the unique requirements of the sector, particularly for control systems. Two tools are 1) use cases that document specific requirements of a system to meet a defined function, and 2) the smart grid roadmap methodology (SGRM) that includes a technology implementation plan for the adoption and deployment of smart grid technology. These tools do not address cyber security in general and are not focused on cyber security for data analytics applications. Therefore, this technical update presents methodologies that may be used by utilities to address cyber security in control systems, in general, and data analytics applications, specifically.



The cyber security risk management, risk assessment, and SGRM methodologies included in this technical update are applicable to all electricity sector systems and applications. Included are high-level diagrams that illustrate the risk-assessment process at the security requirements and security control on stages for ongoing assessment and for assessing emerging changes. In addition, this technical update focuses on data analytics applications for the distribution and transmission sectors. To address this application, specific cyber security use cases/failure scenarios and steps in the risk assessment process were tailored for data analytics. The majority of the failure scenarios in the wide-area monitoring, protection, and control, demand response, and distribution grid management domains are included. For the advanced metering infrastructure and distributed energy resource domains, less than half the failure scenarios are provided. None of the failure scenarios in the electric transportation domain are included. Failure scenarios are excluded if they did not specifically focus on data analytic applications.

SMART GRID DEMONSTRATIONS

The EPRI Smart Grid Demonstration Initiative is a seven-year collaborative research effort focused on design, implementation and assessment of prevalent challenges to integrating all types of distributed energy resources (DER). Material here is from the June-July 2014 issue of the *Smart Grid Advisory Newsletter*. Additional information is available in www.smartgrid.epri.com or contact Gale Horst at ghorst@epri.com.

EPRI Animation of Smart Grid Key Findings

EPRI recently released a video animation highlighting a small sampling of results of the initiative, featuring several technologies and applications, including communications and standards, integration of photovoltaics and batteries, dispatch of customer distributed generation, conservation voltage reduction, customer incentives and more.

The EPRI Smart Grid Demonstration Key Findings video is available on YouTube at http://www.youtube.com/watch?v=uyRPlLJTlkI//. The animation can also be viewed or downloaded at http://www.smartgrid.epri.com/DemoProjects.aspx.

***Smart Grid Demonstration Newsletter* June-July Edition** (Publicly Available), 30-Jun-2014

This edition includes:

- Hawaiian Electric Interconnection Study
- PECO Drexel University Smart Campus
- Maui Smart Grid Demonstration Advisory Meeting Highlights
- The Final Smart Grid Demonstration Advisory Meeting October 27-29 in Charlotte, NC – Jointly coordinated with the DOE
- Smart Grid Animations

A Case Study on Interconnection Requirements Study for HECO Battery Energy Storage Systems on MECO 12.47 Distribution Circuit: Hawaiian Electric Company (Available to Smart Grid Demo Members), 27-May-2014

This case study is an interconnection requirements study for Hawaiian Electric Company's (HECO's) Smart Grid Demonstration. The study is of HECO's two 500-kW Hitachi battery systems to be interconnected to Maui Electric Company's (MECO's) 12.47-kV distribution circuit fed by Kihei substation.

The objective of the study was to determine the impacts attributable to battery projects and any mitigation options for:

- Feeder load flow
- Short circuit and relay coordination
- Islanding
- Grounding and ground fault overvoltage
- Harmonics

The two battery systems are manufactured by Hitachi, Ltd. with specifications as follows:

- Project 1: One long-life lead-acid battery has a 500 kVA inverter, 576 kWh capacity, maximum output/discharge 500 kW, and maximum charge 270 kW. The plan is to install the battery at a wastewater treatment plant.
- Project 2: One lithium-ion battery has a 500 kVA inverter, 153 kWh capacity, maximum output /discharge of 500 kW, and maximum charge of 500 kW. The plan is to install this battery near the Maui Economic Development Board, near the end of the circuit.

This study used advanced computer technologies to simulate the circuit performance with and without the battery storage systems. By comparing the results with and without the batteries, the impacts of the batteries on the existing grid could be obtained. Related industrial standards are discussed and applied to assess the results.

A Case Study on Drexel Smart Campus Project (Publicly Available) 14-May-2014

The Smart Campus Project described in this report was a sub-award of the U.S. Department of Energy (DOE) Smart Grid Investment Grant (SGIG) to PECO, a member of the EPRI Smart Grid Demonstration Initiative. The project included the addition of advanced metering technology and dynamic load management systems at Drexel University in Philadelphia, Pennsylvania. Drexel partnered with Viridity Energy and used its VPower system to enable automatic load control of 10 buildings on campus.

The smart campus mission was to improve Drexel's overall campus energy strategy, with a focus on three main objectives:

- Ensure maximum energy savings, especially by optimizing the use of Drexel's equipment investments
- Gain revenue by trading generation, storage, and controllable load reductions in the wholesale electricity markets

- Begin a partnership that would continuously assess Drexel's needs and make recommendations for future investments in energy-related opportunities

The revenue and savings achieved at these buildings represent more than 10 percent of the annual electricity bill for the selected Drexel buildings. As Drexel continues to move towards realizing additional opportunities in the market, the project team believes savings of 20 to 30 percent may be achievable. This case study presents results from June 2010 to March 2013 regarding the hours of load curtailed, energy savings, and average load response. Lessons learned on implementation of customer-side advanced metering and energy management technologies are also presented.

CEA-2045 MODULAR COMMUNICATIONS INTERFACE (MCI) FIELD DEMONSTRATIONS

The EPRI CEA-2045 Field Demonstration project is a three-year collaborative research demonstration for utilities and vendors to assess the new Consumer Electronics Association CEA-2045 standard. If you have questions regarding this demonstration, please contact Brian Seal at bseal@epri.com, or Chuck Thomas at cthomas@epri.com.

Recommended Changes to ANSI/CEA-2045 from the EPRI Demonstration (Publicly Available), 19-Jun-2014

CEA-2045 specifies a modular communications interface (MCI) to facilitate communications with residential devices for applications such as energy management.

This report includes recommended changes to the ANSI/CEA-2045 standard, to the version published February 2013. The recommended changes were identified by EPRI, utilities, and manufacturers through tasks directly related to EPRI's project titled Field Demonstration of CEA-2045 Standard Modular Interface for Demand Response. The recommendations include new messages and modifications to support use cases of demand response that were overlooked when developing the original standard, which was published in February 2013. This document was prepared with the intent to be submitted to the Consumer Electronics Association's R7.9 working group. Subsequently, this document was submitted to this working group on April 18, 2014. EPRI will continue to document recommended changes and submit those changes to the R8.9 working group.

Introduction to the ANSI/CEA-2045 Standard (Publicly Available), 16-Jun-2014

The Consumer Electronics Association (CEA) is an American National Standards Institute (ANSI) standards-development organization. The CEA-2045 standard specifies a modular communications interface (MCI) to facilitate communications with residential devices for applications such as energy management. The MCI provides a standard "port" or "plug" interface that could be incorporated into off-the-shelf appliances during manufacture in order to make appliances ready to receive and respond to utility demand-response signals. ANSI/CEA-2045 standard includes the mechanical, electrical, and logical features that are required to enable communication modules of any type to be plugged into the appliance. Such devices may include an energy management hub, an energy management controller, an energy management agent, a residential gateway, an energy services interface, a sensor, a thermostat, an appliance, or other consumer products.

This report provides a general overview of this standard. It explains the background of its development, the technical characteristics of the interface, and the capabilities that it supports. The present status is described, including continued developments of the standard, vendor engagement, field testing, and applications beyond load management.

CEA-2045 Field Demonstrations Project Description (Publicly Available), 13-Jun-2014

This report describes the goals and plan for the EPRI CEA-2045 Field Demonstration project. This three-year project is a collaborative research activity designed to assess the new Consumer Electronics Association CEA-2045 standard. The project is providing an opportunity for manufacturers to design and manufacture products and assessed in demonstrates hosted by participating utilities. Participating utilities are fielding various end devices and connecting them into existing and new DR programs to evaluate performance and compatibility of the standard against a wide range of program requirements. Consensus functional requirements for end-use devices are being developed and shared with manufacturers who are producing the CEA-2045 based products for field installation and testing. Communication system providers are being engaged to produce plug-in communication modules needed to connect and test.

The intent of the CEA-2045 standard is to make it practical for end-device manufacturers to mass produce retail-viable "DR-Ready" end devices, at minimal upfront cost, that could be compatible with DR programs everywhere. It also is intended to avoid the need for utility truck-rolls and electricians by being simple enough that consumers could plug in communication modules without assistance.

Mapping EPA Connected Criteria to CEA-2045 (Available to Members of the CEA-2045 Demo), 12-May-2014

This report provides an assessment of the application of the Consumer Electronics Association's ANSI/CEA-2045 standard to the Environmental Protection Agency's EnergyStar "Connected" criteria for appliances.

In coordination with industry stakeholders, the EPA has been developing, for certain product types, new ENERGY STAR specifications that include "connected" criteria. These criteria define a set of communication requirements that must be met in order for the device to be considered "connected" or "connectable." In some cases, the satisfaction of these criteria results in a loosening of the overall energy efficiency requirement of the product. This could serve as a stimulus (potentially temporary) to accelerate the availability of demand-response-ready products in the marketplace.

According to these new EPA specifications, manufacturers have many options for communication technology and architecture, including a standards-based modular interface such as the CEA-2045. This report provides a requirement-by-requirement assessment of the CEA-2045 standard to determine the methods by which it might be applied and the extent to which it does or doesn't satisfy the requirements.

AUTOMATED DEMAND RESPONSE & ANCILLARY SERVICES DEMONSTRATION

The EPRI Automatic Demand Response and Ancillary Services Demonstration project is a three-year collaborative research initiative to assess the performance of OpenADR 2.0b for utility applications of the standard for management for various types of distributed energy resources in a variety of utility and ISO programs. With the growing number and variety of Distributed Energy Resources (DER) being deployed ranging from demand response end devices to types of distributed generation like solar photovoltaics, it is becoming increasingly important to have products communicate using standardized protocols so each new type of resource (load or generation) doesn't require a customized interface. OpenADR (Open Automated Demand Response) is an open, standardized protocol to do just that – standardize, automate and simplify communications and management of the growing number of controllable resources connected to the grid.

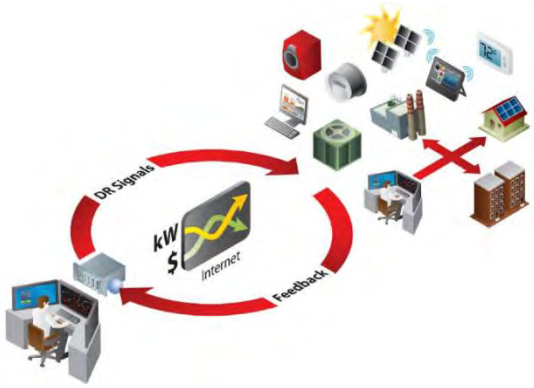
If you have questions regarding this demonstration, please contact Walt Johnson at hwjohnson@epri.com, or Chuck Thomas at cthomas@epri.com.

***Automated Demand Response and Ancillary Services Demonstration Project Newsletter*, April 2014** (Available to Members of the Demo), 29-Apr-2014

This newsletter provides information about EPRI's Automated DR and Ancillary Services Demonstration project. The EPRI open-source implementations of the Profile 2.0b Virtual Top Node (VTN) and Virtual End Node (VEN) were released in January and are proving to be very popular. Two training sessions on the software have been held to date. OpenADR continues to receive increasing attention across the industry. More and more products are being certified by the OpenADR Alliance and the Profile B specification has been the subject of standards activity at the IEC. Also, California is about to begin requiring "demand responsive controls" in their statewide energy efficiency requirements. More information on all these topics can be found in this newsletter.

Automated Demand Response and Ancillary Services Demonstration Project Update: Volume One
(Available to Members of the Demo), 30-Apr-2014

As part of EPRI's Automated Demand Response demonstration, pre-certification versions of EPRI's open source OpenADR 2.0b Virtual Top Node and standalone Virtual End Node (VTN and VEN) software were released early this year and have proven to be very popular. Thus far, more than 1000 copies of the VTN and over 670 copies of the VEN have been downloaded from SourceForge. Also, the software is gathering significant international attention, with the majority of download requests coming from non-U.S. locations.



EPRI is working with utilities to demonstrate the use of the OpenADR protocol in real-world situations. Four demonstrations are being conducted -- two are focused on retrofitting building energy management systems; another deals with hierarchical management of demand response resources across a wide geographical area. The fourth demonstration employs OpenADR to support the notification and approval of pending demand response events to balance variable-output renewable energy resources, using both heating loads and electric vehicle chargers. The four demonstrations highlighted are from:

- Southern Company
- California Independent System Operator (CAISO)
- Électricité de France (EdF)
- ESB Networks, Ireland

KEY DATES

September 8-10, 2014 EPRI Power Delivery and Utilization Advisory Council Meetings, Nashville, TN

The role of Power Delivery and Utilization Advisory Councils is to review the progress of ongoing research within their respective collaborative R&D programs, identify new issues requiring resolution, and prioritize the future research programs to meet the needs of the industry, decision-makers, and the public.

IntelliGrid (P161) and Cyber Security (P183) advisors are invited to participate in the meetings, which are held twice each year. Attendance is strongly encouraged as a benefit of your EPRI membership. If you are a member of these programs, register online here.

September 10-11, 2014 EPRI Power Delivery Sector Council Meeting, Nashville, TN

The Power Delivery and Utilization (PDU) Sector Council advises EPRI management and staff on the technical content, strategic planning and future direction of the PDU research portfolio. Sector Councils are comprised of 140 executives from member companies, usually at the director or vice president level. This includes the ICT Council primarily made up of CIO's that provide executive guidance on the IntelliGrid and Cyber Security research programs. The Sector Council meetings follow the Program Advisory Council meetings, and will meet Wednesday afternoon followed by a full day of meetings on Thursday. Membership is by invitation of the Sector Vice President with guidance from the PDU Sector Executive Committee. To be eligible, companies must be broadly engaged in EPRI's PDU Sector activities.

PDU Sector Council members are invited to also attend the preceding Program Advisory Council meetings on Monday, September 8 through Wednesday afternoon, September 10. If you are a member of the EPRI Sector Council, register online here.

IntelliGrid 2015 Program Changes to the ICT Program – Webcasts

- **ICT 2015 Annual Research Portfolio Webcast on all six project sets in program 161A-F**
  September 15, 2014, 1:00 p.m. Eastern/10:00 a.m. Pacific, Add to Outlook Calendar
- **ICT for Transmission 2015 Webcast – Detailed Review project set 161B**
  September 22, 2014, 11:00 a.m. Eastern/8:00 a.m. Pacific, Add to Outlook Calendar
- **ICT for Distribution 2015 Webcast – Detailed Review of project set 161C**
  September 23, 2014, 11:00 a.m. Eastern/8:00 a.m. Pacific, Add to Outlook Calendar
- **ICT for Distributed Energy Resources (DER) & DR Webcast – Detailed Review of set 161D**
  September 24, 2014, 11:00 a.m. Eastern/8:00 a.m. Pacific, Add to Outlook Calendar
- **Enterprise Architecture and Integration Webcast – Detailed Review of project set 161E**
  September 25, 2014, 11:00 a.m. Eastern/8:00 a.m. Pacific, Add to Outlook Calendar
- **Advanced Metering Systems Webcast – Detailed Review of project set 161F**
  September 30, 2014, 11:00 a.m. Eastern/8:00 a.m. Pacific, Add to Outlook Calendar

October 27-29, 2014, The Smart Grid Experience: Applying Results, Reaching Beyond, Charlotte, NC

EPRI and the U.S. Department of Energy (DOE) invite you to their combined meeting, "The Smart Grid Experience: Applying Results, Reaching Beyond." This will be the final meeting of the EPRI Smart Grid Demonstration Initiative and will have an emphasis on reporting lessons learned and understanding technology deployment decisions. This conference will bring together the collective learnings from both the EPRI Smart Grid Demonstration Initiative and the DOE American Recovery and Reinvestment Act (ARRA) Smart Grid programs. As an attendee, you can gain insights from the unprecedented investments in Smart Grid deployments with a focus on successes, surprises and challenges in applying results and reaching beyond current deployments and into the future phases of grid modernization.

Among the smart grid demonstration topics to be addressed are:

- Transforming the Grid through Integration
- Conservation and Optimization via Volt/var Control
- Systems Driving the Integrated Grid
- Communications: The Foundation of the Modern Grid
- AMI Beyond Meter Reading
- Enabling the Smarter Consumer

Visit the EPRI Events Calendar listing for more details and to register.

Short Courses from the Center for Grid Engineering Education – GridEd

In 2013, EPRI and a team of university partners received one of the Department of Energy awards for a project known as Grid Engineering for Accelerated Renewable Energy Deployment (GEARED). This educational initiative seeks to develop and train the next generation of power engineers so that they can help shape the electric grid of the future by anticipating and fulfilling the needs of changing requirements.

EPRI members have identified workforce development and education as one of the high priorities in the industry on numerous occasions. You can get an overview of GridEd at the web site– http://grided.epri.com and here are some upcoming training opportunities.

- *August 20 & 21, 2014, Course 2: Electric Power Distribution Systems, New York City*
- *September 11 & 12, 2014, Course 3: Dynamic Distribution System Modeling, Nashville, TN*
- *September 29 & 30, 2014, Course 4: Business Case Analysis in Electric Utility Industry, Washington D.C.*
