EPRI ELECTRIC POWER RESEARCH INSTITUTE

GridEd

The Center for Grid Engineering Education

Information and Communication Technologies for Distributed Energy Resources and Systems

Course Description

This course trains participant in understanding the fundamentals and applying the information and communication technologies (ICT) for distributed energy resources (DER) and systems such as demand response (DR), solar, energy storage, and electric vehicles. Electric utilities and grid operators across the world are looking at solutions for effective use and operation of the smart grid in the era of increasing deployments of DER technologies such as solar, energy storage, and flexible loads for demand response (DR). A vital element of the solution is to enable interoperable and cost-effective monitoring and control of these resources. Example applications include: (a) leveraging grid-facing services across a variety of types, makes, and models of grid-connected DER; (b) optimization of the dispatch of front-of-the-meter and behind-the-meter DERs through advanced distribution grid control systems such as Distributed Energy Resourced Management Systems (DERMS) and DR Management Systems (DRMS); and (3) enabling information exchange for grid modeling that unlock new benefits from DER management. While some regions offer DR programs, others are aggressively deploying distributed generation and electric vehicles. Under this not-so-distant future state underlies the ICT backbone that supports access and management of DER devices and systems.

This course covers DER 101 or fundamentals and background on the communication technologies and half-a-dozen data protocols (each with a unique purpose) available for communicating with a diversity of DERs over the grid network architecture, the associated information models to define the format and meaning of data transported over these protocols, example applications of deployment these protocols and data models for interoperability, and summarize the trajectory of adoption of these technologies in the smart grid.

The course answers questions like “What is a DER?” “What are the recommended communication technologies and architecture for DER?” “Why are communications important for DER?” “What standards are out there to streamline communicating with DER at interconnection and over the life of the device?” “Why is interoperability important for DER?” “Who are the responsible parties for adopting these standards?”

This course is designed to train and inform technical and decision-making staff involved in the planning and operations of the programs for DR, procurement and installation of DER, integration of solar, storage, and EV systems, and development of advanced utility-scale grid management systems. The stakeholders include, but not limited to, electric utilities, grid operators, aggregators, DER equipment manufacturers, and system integrators.

Date: November 5th and 6th
Course Length: 8 hours

Location: Live-Online
Registration: https://tinyurl.com/y6nekl2z

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Day 1 (4 hours)

The Context for DER Technologies, Communications, and Systems

1.1 The Value of a Grid-Connected DER

- ❑ Grid Modernization Paradigms
- ❑ Distributed Energy Resources 101
- ❑ Value Domains – Customer and Grid Management

1.2 Information and Communication Technology Fundamentals for DER

- ❑ Communication and Control Protocols
- ❑ Information Models | Data Definitions

1.3 ICT Maturity – Present and Future States

- ❑ Comparison of Alternatives
- ❑ ICT in Industry Requirements, Mandates, and Grid Codes

Break (15 minutes)

Exercise: Determining Integration Architecture, Standards, and Actors for DER

Day 2 (4 hours)

A Deep Dive into Standards, Telecommunications, and Reference Implementations

2.1 Private Long-Term Evolution (LTE) Network Overview

- ❑ Integrated Platform and Economics
- ❑ Utility Use Cases for DER
- ❑ Reference Implementations

Break (15 minutes)

2.2 Standards to Streamline Grid Interoperability

- ❑ Harmonization, Interoperability, Interconnection
- ❑ Smart Grid Actors and Domains
- ❑ Example Implementations and Architecture Models

2.3 Standards and Architecture to Integrate DERs

- ❑ Demand Response
- ❑ Energy Storage
- ❑ Electric Vehicle

Exercise: Develop Solution for an Energy Storage Use Case for DR Program

Meet the Instructors

Rish Ghatikar is a Senior Program Manager and leads the information and communication technologies (ICT) for distributed energy resources (DER) and integration research at Electric Power Research Institute (EPRI). The research identifies, creates, and transfers digital automation solutions into the power systems. Before EPRI, Rish has co-led the Grid Integration research at the U.S. DOE's Lawrence Berkeley National Laboratory and was the Chief Research Officer at Greenlots (a Shell New Energy Company).

Rish's work has appeared in over 95 publications and he holds dual Masters degrees in Telecommunication Systems/Computer Technologies and Infrastructure Planning.

Doni Nastasi is a Technical Leader at the Electric Power Research Institute (EPRI). He manages projects and provides technical support for EPRI's Information and Communication Technologies (ICT) program.

He has coauthored at least 25 technical publications at EPRI in the subject areas of power quality, grid modernization, and stray voltage. As a hardware and software designer, he holds three patents for designs involving voltage sag testing, energy storage and detection of stray voltage. Doni received a Bachelor of Science degree in electrical and computer engineering at the University of Tennessee, Knoxville.

Chuck Thomas is a Sr. Technical Leader at the Electric Power Research Institute (EPRI). He leads projects related to CTA-2045 and provides technical support for EPRI's Information and Communication Technologies (ICT) program. Chuck has contributed to the development and adoption of ANSI/CTA-2045 communication standards, enabling consumer-owned technologies to automatically respond to dynamic grid conditions.

Chuck has co-authored over 65 publications and holds a B.S. degree in Electrical and Computer Engineering from University of Tennesse.

Tim Godfrey is a Technical Executive with the Electric Power Research Institute, specializing in Telecommunications.

He manages the Telecom project set in the Information and Communications Technology program. He is involved in standards development and communications system architecture, design, simulation, and evaluation. He is an IEEE Member and the Chair of the IEEE 802.24 Smart Grid Technical Advisory Group and the 802.15.16t Task Group. Tim has 24 granted patents and holds a BSEE from the University of Kansas in electrical engineering.