

Southeastern Distribution Apparatus School & Conference

Module 100	Module 200	Module 300	Module 400
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Monday

10:00 - 4:00	Registration
1:30 - 1:45	General Session
1:45 - 2:30	Michael Kotelec, <i>Verizon</i> SMAC - Social, Mobile, Analytics and Cloud
2:30 - 3:00	Networking Refreshment Break
3:00 - 4:00	Eric Dresselhuys, <i>Silver Spring Networks</i> Internet of Things (IoT) for Utilities
4:00 - 5:30	Hospitality / Exhibit Hall

Tuesday

8:30 - 10:00	Electrical Fundamentals & Power Theory	Protective Grounding	Power System SCADA and Smart Grids	Analysis Through Symmetrical Components
10:00 - 10:30	Networking Refreshment Break in Exhibit Hall			
10:30 - 12:00	Substation Devices & Equipment Overview	Protective Grounding - Continued	Power System SCADA and Smart Grids - Continued	Communications in the Energy Cloud
				Weather Analytics & GIS Tools
Lunch				
1:00 - 2:30	Distribution Devices & Equipment Overview	Application of Voltage Regulators & Capacitors	SCADA Integration Case Study	Cable System Diagnostics
			Cybersecurity & Data Breach Investigations	
2:30 - 3:00	Networking Refreshment Break in Exhibit Hall			
3:00 - 4:00	SCADA Fundamentals	Substation Breakers	Data Driven Action - Data Mining for Utilities	Utility Roundtable Session
4:00 - 5:30	Hospitality / Exhibit Hall			

Classes are open to all attendees and exhibitors

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Wednesday	8:30 - 10:00	Voltage Regulators	Fuse & Recloser Coordination	Integrated Communications	Secondary Voltage Regulation - The Missing Zone
	10:00 - 10:30	Networking Refreshment Break in Exhibit Hall			
	10:30 - 12:00	Fundamentals of Distribution Feeder Protection	Battery Technology	Integrated Communications -Continued	Distributed Energy Resources (DER) Integration
					PV Integration Acceptance Testing
		Lunch			
	1:00 - 2:30	Transformer & Arrow System	System Protection	DNP3 Deep Dive	Power Quality
	2:30 - 3:00	Networking Refreshment Break			
	3:00 - 4:00	Infrared Overview	Overvoltage Protection	Managing IoT Cellular Devices Securely	Power Quality - Continued
	5:00 - 6:00	Annual Dinner			
	6:30 - 9:30	Casino Royale - Ballroom A			

Thursday	8:30 - 10:15	Electric Vehicle Charging Impacts on the Distribution System
		Smart Cities - Information and Communication Technologies
	10:15- 10:45	Networking Refreshment Break
	10:45 - 12:00	Connected Communities - Integrated and Planned
	12:00	Closing Session

Opening Session

Michael Kotelec

Verizon Enterprise Solutions

SMAC - Social, Mobile, Analytics and Cloud
SMAC stack is the concept that makes use of social interactions, mobility, analytics driven by big data and cloud technology to simplify the customer experience while boosting productivity. This session will discuss how digital technologies are transforming the energy and utilities industries along with a look at future industry trends.

The Internet of Things (IoT) for Utilities

Instructor: Eric Dresselhuys, Silver Spring Networks

The IoT is built by integrating Internet connectivity into all kinds utility equipment and devices. Smart networks and smart devices are increasing throughout the grid and adding intelligence to existing infrastructure. As more and more IP-connected devices enter the energy industry, the focus will become centered on managing an Internet of Things (IoT) throughout the utility enterprise. Enhancing the grid with digital control, monitoring and telecommunications capabilities enables automated, bidirectional flow of information. This session will discuss the applications and solutions that are an integral part of the Internet of Things.

Module 100:

Fundamentals of Distribution System Apparatus

Electrical Fundamentals & Power Theory

Instructor: Mike Chirico, South Alabama Electric Cooperative

AC and DC circuit theory including ohms law and associated math, circuit components, and current and voltage laws. Included are discussion of the relationship between current, voltage, resistance, impedance, power and energy. An expansion of the basic electricity review class – with an elaboration on volts, amps, power factor, etc. Definition and applications of KW, KVA, the power triangle, and calculating power factor.

Substation Devices & Equipment Overview

Instructor: Bob Cheney, Alabama Power

Get an overview of key substation equipment and devices such as: transformer, breakers, batteries, reactors & voltage regulators. This course will focus just on the devices and equipment found within the Substation fence. It will give you a high level understanding of how a substation works.

Distribution Devices & Equipment Overview

Instructor: Jon Moore, Coweta-Fayette EMC

Get an overview of key distribution equipment & devices outside the Substation fence such as: transformers, capacitor banks, regulators, fuses,

lightning arrestors, reclosers, etc. This class will show how equipment works and coordinates together. It tries to explain at a high level how the distribution system works as a whole.

SCADA Fundamentals

Instructor: Chad Sheurpukdi, Georgia System Operations

An introduction of all the components involved in a SCADA system. The types of components to be discussed are RTUs, master stations, digital and analog inputs / outputs, and IEDs.

Voltage Regulators

Instructor: Dan Schmidt, Eaton

This class will center on how a regulator works and the internal components. Covers how they are used in distribution systems along with basic operation & functions. Covers safety issues such as by-passing & deenergizing regulators. Basic inspection procedures.

Fundamentals of Distribution Feeder Protection

Instructor: Craig Wester, GE Grid Solutions

This class provides a basic understanding of the principles of relaying and protection of the electric distribution feeder. Topics included in this class are why relays are used, how relays protect the feeder, applications of various types of relays, and relay coordination.

Transformers & Arrow System

Instructor: Jason Waters, Georgia Power

Discussion in this class will include components and internal workings of a transformer. Covers how a transformer works and how it is used on the distribution system. Learn the meaning of transformer polarity and how to easily hook up transformer banks using the Arrow System.

Infrared Overview

Instructor: Dan Allen, FLIR

This class explains the purpose and operation of infrared cameras and the applications in the field. The class will provide a opportunity for hands-on demonstrations.

Module 200:

Principles & Applications of Distribution System Apparatus

Protective Grounding

Instructor: Steve Blume, Applied Professional Training

This class gives a comprehensive understanding of the theory and practice of safe electrical grounding principles as it relates to the individual. There will be discussion on the OSHA requirements, understanding ground potential rise, touch and step potential, and vehicle safety along with applications, principles and procedures related to grounding.

Application of Voltage Regulators & Capacitors

Instructor: Bob McFetridge, Gridco Systems

Explanation of why voltage regulators are needed and how they work. Topics include the placement of regulators, settings, and effects on the distribution system. Class will cover safety considerations of voltage regulators. Also a discussion on why capacitors are used in the distribution system and how they work. Defines terms such as working power, non-working power and power factor. Also, how they work in conjunction with regulators which also affect system voltage.

Substation Breakers

Instructor: Tom Hix, Georgia Power Company

This class will include common functions, types, how breakers work and why the equipment is used. Learn about protection schemes, protective relays and how to bypass breakers. Learn about the different interruption mediums such as oil, SF6 or vacuum. Discusses testing, inspection & sampling practices. Students will learn about the components of dissolved gas analysis testing.

Recloser Coordination

Instructor: Chad Capps, Gresco Utility Supply

Covered in this class will be single and three phase reclosers. How they operate and how they are used on the distribution system. Helps you understand how they coordinate with other devices such as station relays and fuses. Helps you understand key differences between electronic reclosers and hydraulic, and the pros and cons of both.

Battery Technology

Instructor: Chris Gray, Alpha Technologies

Battery applications and common practices in the electrical industry. Also pros and cons of battery types and construction will be covered. Standard testing procedures and maintenance intervals are part of the agenda.

System Protection

Instructor: Keith Hardt, Pungo Engineering Services

Study of power system faults and application of relays for power system protection. Covered in this class will be station protection, feeder protection and some distribution automation schemes. Also the coordination between devices with isolation and restoration techniques.

Overvoltage Protection

Instructor: Steve Brewer; Hubbell Power Systems

Covers how arresters work and their use in the distribution system. It introduces the student to how lightning and other causes create overvoltage on the system. We also introduce the student to the concepts of BIL (Basic Insulation Level) ratings of equipment / hardware. We discuss the importance of properly grounding the system to make arresters operate properly.

Module 300: SCADA and Communications

Power System SCADA and Smart Grids

Instructor: John McDonald, *GE Grid Solutions*
The course will begin with the history of SCADA, which aids in understanding SCADA fundamentals. With basic SCADA as the foundational platform, applications can be layered on top of basic SCADA for SCADA/AGC and SCADA/EMS for generation and transmission, or for SCADA/DA and SCADA/DMS for distribution. These systems will be compared with each other regarding functionality and price. Different techniques for intelligent alarm processing will be described. A DMS architecture diagram will be discussed, including control center, field equipment and communications components. Software applications for an advanced DMS will be described. The fundamentals of substation automation, or substation SCADA, and distribution feeder automation will be discussed. The role of SCADA in Smart Grid will be described. The PowerPoint course material will be supplemented with utility case study technical articles.

SCADA Integration Case Study - Dickson Electric System

Instructor: Chase Lewis, *Dickson Electric System*
This presentation will discuss the integration of SCADA, DA, AMI, and OMS at an electric utility.

Cybersecurity & Data Breach Investigations

Instructor: Robert Gustin, *Verizon Wireless*
Every organization relies on digital in some way—to communicate, to transact, to compete. There are more devices to protect, more people with access to data and ever more partners to integrate with. New technologies threaten to give attackers new opportunities. Cybersecurity is a key issue within utilities and will be the topic of this session. Included also will be the results of Verizon's Annual Data Breach Investigations Report.

Data Driven Action - Data Mining for Utilities

Instructor: Zac Canders, *DataCapable*
Making smart business decisions is not driven by how much data you have – but by how quickly you can discover insights from all that data. Data Mining has made a profound impact on business practices and knowledge management in recent years. Data mining enables utilities to better correlate information to enhance reliability and provide predictive analytics. This session will discuss data sources and solutions such as social media, outage management along with customer engagement.

Integrated Communications

Instructors: Bryan Seal, *Itron*; Billy Wise, *Gresco Utility Supply*
With the implementation of Smart Grid, technology will be continually changing and the need for bandwidth will be ever increasing. Security

requirements will continue to evolve and remote end point device management is paramount. Communication is a vital component of a reliable interaction to equipment and customers of a utility. Learn the needs of communication along with a technology overview of Smart Grid Communication Media. Detail discussion on terminology, serial connectivity and Internet connectivity. In depth review of communication components and basic networking with example architecture. Also will be a hands-on demonstration of the interaction of a viable communication network.

DNP3 Deep Dive

Instructor: Michael Thesing, *Patterson & Dewar Engineers*
DNP3 continues to thrive in North American and internationally as the most interoperable SCADA protocol for electric utility operations. There are, however, a number of advanced characteristics of the protocol that extend beyond the simple transfer of common binary, analog, and control data. This talk will present a “deep dive” into DNP3 beyond the basics including, but not limited to, secure authentication of DNP3 controls, what the protocol “layers” really mean, control relay output block codes, and deciphering a device profile document.

Managing IoT Cellular Devices Securely

Instructor: Lisa Banerjee, *AT&T Mobility Services*
Learn how AT&T Cellular is making it easy to connect IoT device found in grid automation. This session covers what you need to know about cellular IoT security, including VPN architecture requirements and how to manage those devices through Control Center, a device management platform.

Module 400:

Engineering Topics & Emerging Technology

Analysis Through Symmetrical Components

Instructor: Terry Smith, *GE Grid Solutions*
This class will review the fundamentals of phasor diagrams, sequence components and sequence networks. These fundamentals will be demonstrated with real world examples from fault conditions and incorrect wiring.

Communications in the Energy Cloud

Instructor: Robert Wilhite, *Navigant*
In the coming Energy Cloud future, electric utilities will evolve to where the grid becomes a critical, two-way network for energy services. These services may include integrated solar and wind, transactive energy markets, microgrids, energy storage, and other disruptive technologies. Utilities will increasingly depend upon the Energy Superhighway. This is the robust, ubiquitous, high bandwidth, low latency communications backbone that will be necessary to support the many software- and hardware-based systems that will ultimately power the Energy Cloud. Some key topics that

will be discussed are the importance of the utility's communication backbone, which communication technologies will be future proof along with taking a long term view of the utility networking strategy;

Weather Analytics & GIS Tools

Instructor: Lance Maxwell, *Weather Decision Technologies*
Utilities large and small now have the ability to substantially reduce outage and disruption times by merging precision weather data and analytics with newly-developed internal mapping platforms. In this presentation, discover some of the new, easily-accessible weather map services and alerting tools being used to get the power back on quicker than ever before.

Cable System Diagnostics

Instructor: Nigel Hampton, *NEETRAC*
This session will discuss the various diagnostic technologies to establish the condition of medium voltage underground cable circuits. Topics covered will be how cable systems age and fail, various technologies available for detecting potential failure sites, advantages and disadvantages of different diagnostic technologies, and different approaches for utilities to employ cable system diagnostics.

Utility Roundtable Session

Instructors: Brian Chandler, *City of Troy Utilities*; Chuck Wallis, *Wallis Engineering*
This session is open to utility personnel to discuss best practices along with engineering and technology issues. Students will be able to ask questions of their peers.

Secondary Voltage Regulation - The Missing Zone

Instructor: Bob McFetridge, *Gridco Systems*
This presentation will discuss the need to provide dynamic voltage regulation on the 120/240 secondary side of some distribution transformers. With the advent of residential solar panels, some secondaries have generation and bi-directional power flow which can create voltage rises leading to high voltages. Conservation Voltage Reduction is allowing the utilities to operate the primary voltages at the lower end of allowable limits and this can cause some secondaries to experience low voltage issues. Increased loading due to electric vehicle car chargers can also create low secondary voltages. With this in mind many utilities are evaluating new technologies for secondary voltage regulation including smart inverters, regulators and capacitors. The presentation will define several of the applications and investigate the advantages and disadvantages of applying the different technologies in order to mitigate the problem voltages. The paper will include a discussion on how to identify probably secondary voltage violations using modeling and AMI data.

Distributed Energy Resources (DER) Integration

Instructor: Rob Harris, *PowerSecure*
Distributed energy resources (DER) are smaller power sources that can be aggregated to provide power necessary to meet regular demand. As the

electricity grid continues to modernize, DER such as storage and advanced renewable technologies can help facilitate the transition to a smarter grid. Deploying DER in a widespread, efficient and cost-effective manner requires complex integration with the existing electricity grid. Additionally, discussion on the operational considerations and challenges associated with bringing Distributed Resources online.

PV Integration Acceptance Testing

Instructor: Keith Harley, Georgia Power Company

When PV is connected to the grid a series of testing must be performed before the installation can be accepted. This session will review the types of testing conducted: Transient over Voltage, Single Phase Disconnect, Delayed Start of Generation, Power Factor Control, Current Harmonics, Radio Frequency Interference and Secondary Injection Tests.

Power Quality Issues and Solutions

Instructor: Mark Halpin, Auburn University

This class will provide an introduction to power quality. We will focus on typical problems that are associated with low power quality. Also in this module, we will separate “power quality” from “bad engineering” while providing numerous examples of each. Power quality topics discussed include voltage drop, harmonics, capacitor switching, grounding, and others

Connected Communities - Integrated and Planned

Instructor: Jim Leverette, Southern Company Services

The network foundation of a Connected Community is merging of physical infrastructure, robust communications and data analytics. This network enables intelligent applications that allow a community to deliver essential services more efficiently and reliably. A Connected Community project integrates several elements. The complexity of this integration requires careful planning and deployment to ensure success of the project.

Closing Session

EV Charging Impacts on the Distribution System

Instructor: John Halliwell, EPRI

There are nearly 500,000 plug-in electric vehicles operating in the US today. How are these vehicles being charged and how will they impact the electric distribution system, especially as their numbers grow? This presentation will discuss vehicle load profiles, charging options, consumer charging habits, future trends in charging and the interaction of plug-in electric vehicle charging with the electric grid today and in the future.

Smart Cities - Information & Communication Technologies

Instructor: Diane McBeth, Southern Company Services

A key factor in the development of modern cities is an integrated and digital infrastructure. With automated and intelligent infrastructure technologies, a smart city gathers data from smart devices and sensors to create valuable information and enhanced services. The goal of building a smart city is to improve quality of life by using technology to improve the efficiency of services and meet residents' needs. Technology allows city officials to interact directly with the community and the city infrastructure and to monitor what is happening in the city, how the city is evolving, and how to enable a better quality of life.