SMART ENERGY

Southern Company
Smart Grid

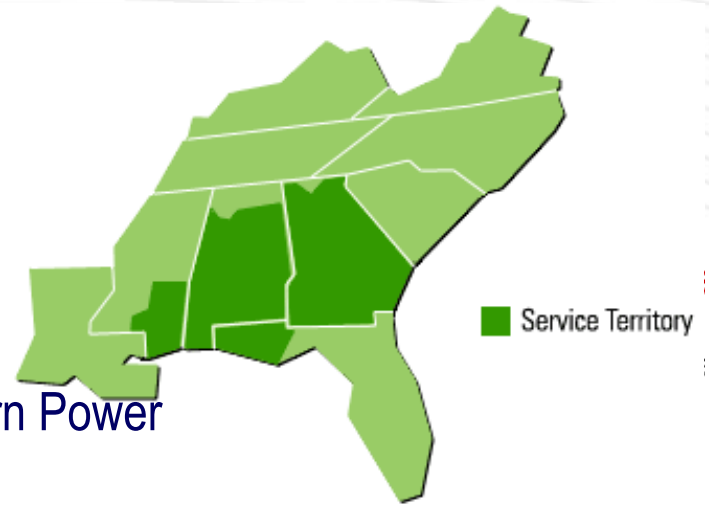
Smart Grid Investment Grant Update

July 25, 2011

SOUTHERN COMPANY

Southern Company

- Southern Company is one of the nations largest generators of electricity
- Has 4.4 million retail customers across 120,000 square miles of service territory
  - Alabama Power
  - Georgia Power
  - Gulf Power
  - Mississippi Power
- Vertically Integrated –Generation / Transmission / Distribution
- 4 Operating Companies, SoCo Services (IT, HR), Southern Linc(Telecom), Southern Nuclear, Southern Power
- 2009 Generation – 43,000 MW
  - Coal –57%
  - Natural Gas / Oil –23%
  - Nuclear –16%
  - Hydro, Renewable –4%



Smart Energy

Smart Power




Smart Grid



CUSTOMERS


earth cents

Smart Choices

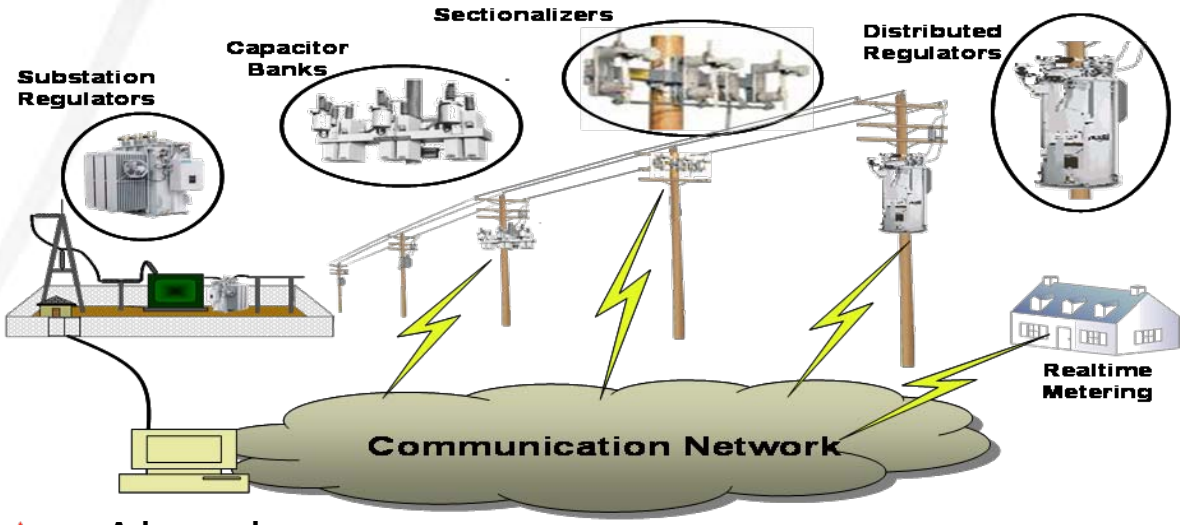
SoCo Smart Grid – 1990-2009

Existing SoCo Smart Grid Technologies

- **SCADA** – Deployed in over 90% of substations
- **Distribution Automation**
  - Automated line devices on nearly 40% of circuits
  - Automated Fault Isolation and Restoration Schemes
- **Conservation Voltage Reduction** system
  180 MW load reduction

T&D Smart Grid Communications

- **MAS** and **SoLINC** - expand existing internal infrastructure
- **AMI FlexNet** network for specific applications – cap monitors
- **Commercial carrier** networks – piloting now
  - Addresses coverage and bandwidth needs
  - Assuming appropriate service level support
- Monitor industry developments and FCC actions

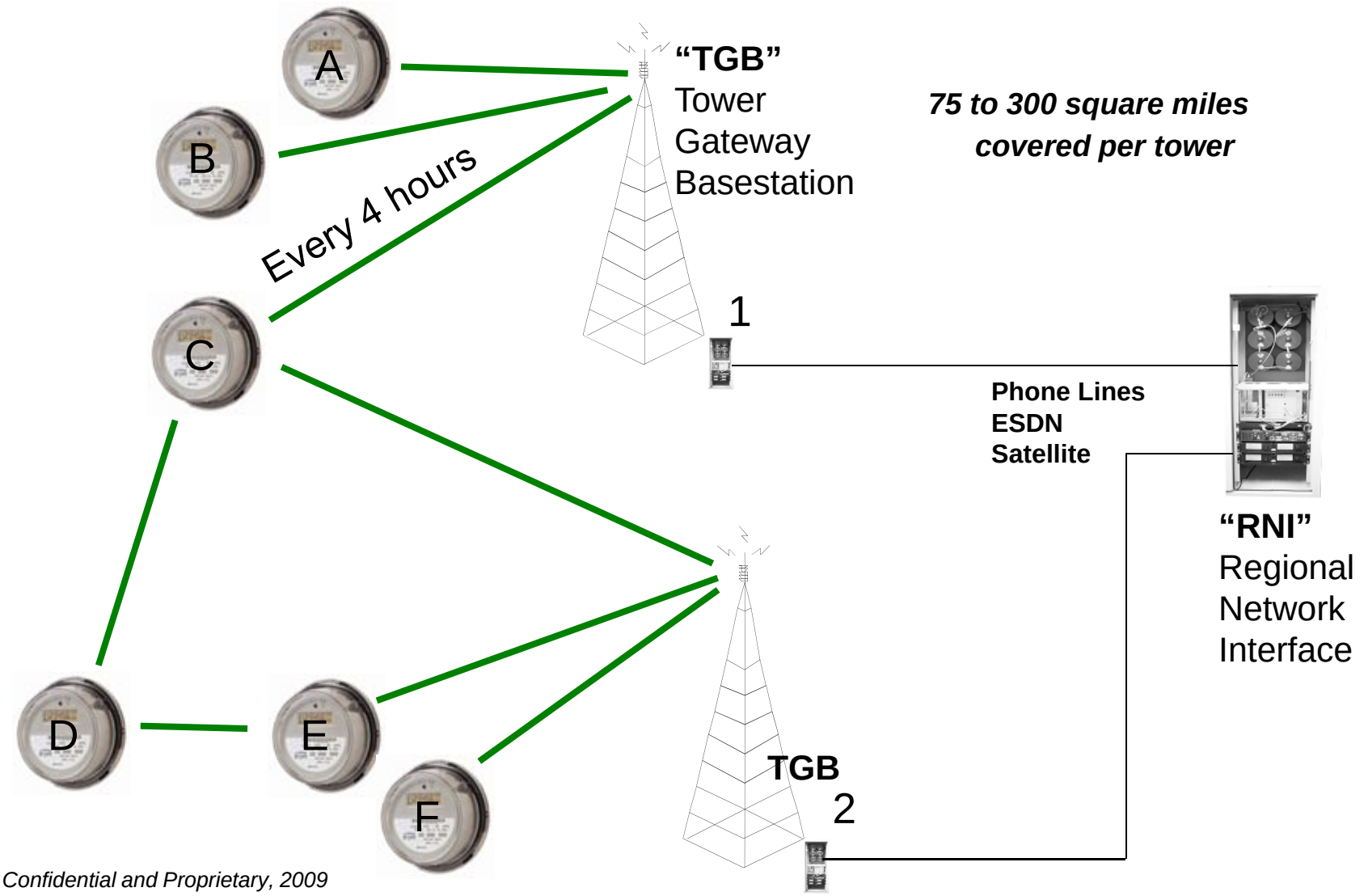


SoCo Smart Grid Strategies

Customer Interaction Strategies

- AMI deployment – 4.4 million
- Expand dynamic / TOU pricing
- Demand Response
- Smart appliances for demand response?
- Web hosted applications?

AMI - The Sensus "Flexnet" System



Southern's AMI Objectives

- Continue to accurately read meters and correctly bill customers in a timely manner
- Reduce operating costs associated with
  - monthly meter reading
  - off-cycle meter reading
  - providing other meter services.
- Use advanced technologies such as power outage detection and power restoration to improve the response to electric distribution system events.
- Provide a technology platform enabling future customer services and options.

AMI – Smart Meters

Allows us to…

- Virtually eliminates manual meter reading
- Read any meter anytime without a site visit
- Significantly reduces meter reading estimates
- Ability to locate stolen meters
- Offer a variety of rate options to customers

The meter sends back…

- Meter health diagnostics
- Voltage information
- Tamper detection
- Outage information

Southern Company SGIG Award

Transmission & Distribution Crosscutting Project

- Three year project 2010 – 2013

- Total Project Cost - $331 M
- SCS Funding - $166 M
- DOE Funding - $165 M

Department of Energy Smart Grid Investment Grant

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Southern Company Services
Smart Grid Investment Grant project

Five major projects areas:

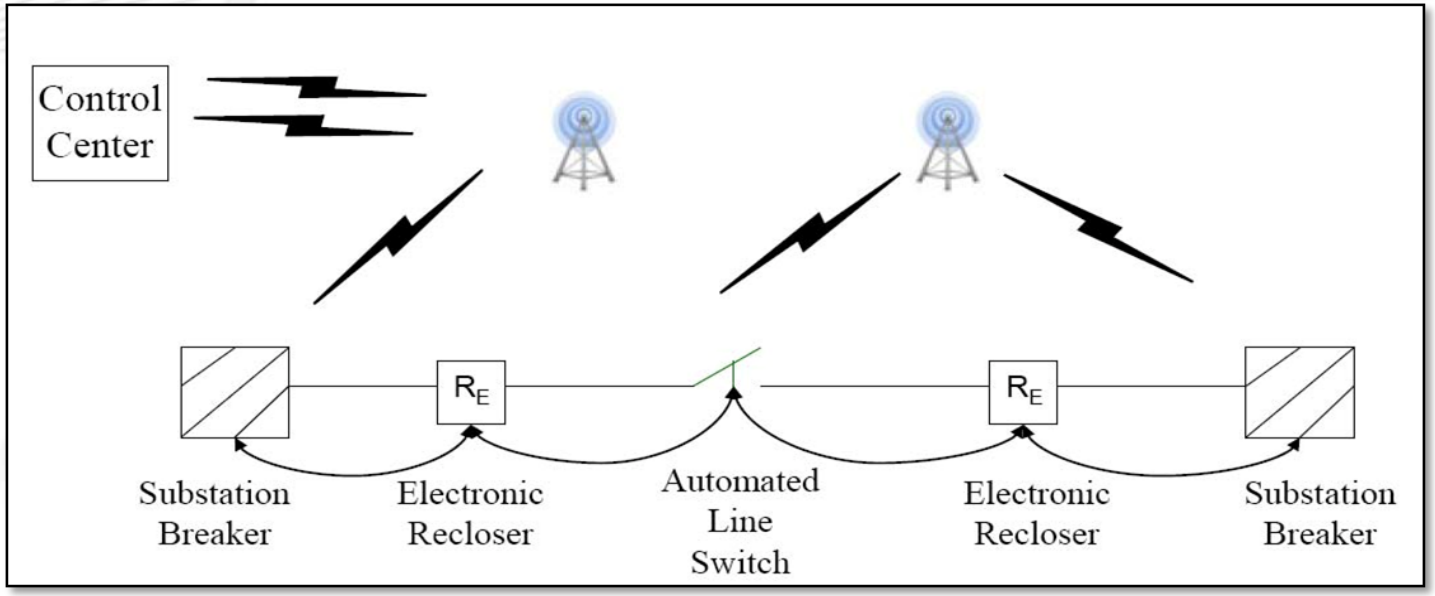
- Distribution Energy Efficiency Program (DEEP)
- Integrated Distribution Management System (IDMS) / Supervisory Control and Data Acquisition (SCADA)
- Distribution Automation (DA)
- Transmission Line Automation (TA)
- Smart Substations (SS)

Southern Company Smart Grid Investment Grant

T&D Smart Grid Project Components (in millions)	APC	GPC	GULF	MPC	TOTAL
DEEP (Distributed Energy Efficiency Program) •Improves efficiency and reduces losses •Reduces generation requirements and associated fuel costs	$36.1	$33.1		$1.8	$70.9
IDMS and SCADA Fault Locating •Anticipates and responds to system disturbances •Provides fault location information for quicker restoration	$22.5	$19.5	$1.0	$1.1	$44.1
Distribution Automation •SCADA-enabled, automated line devices •Self-healing networks improve reliability	$29.7	$27.2	$10.9	$3.5	$71.3
Transmission Line Automation •SCADA-enabled automated line switches •Self-healing networks	$16.4	$3.4			$19.8
Smart Substations •Micro-processor based relays and remote asset monitoring devices allow for predictive maintenance and reduced costs	$36.7	$22.0	$19.8	$45.4	$123.9
Total Allocation of $330.1	$141.4	$105.2	$31.7	$51.8	$330.1

Automation / Reliability Strategies

- **Automated devices** – Significantly increase number of switches and reclosers
- **Self-healing networks** (or automatic fault isolation and restoration schemes) – Accelerate deployment



Automation / Reliability Strategies

- **Fault Location -** Install electronic relays and applications to enable automated fault location

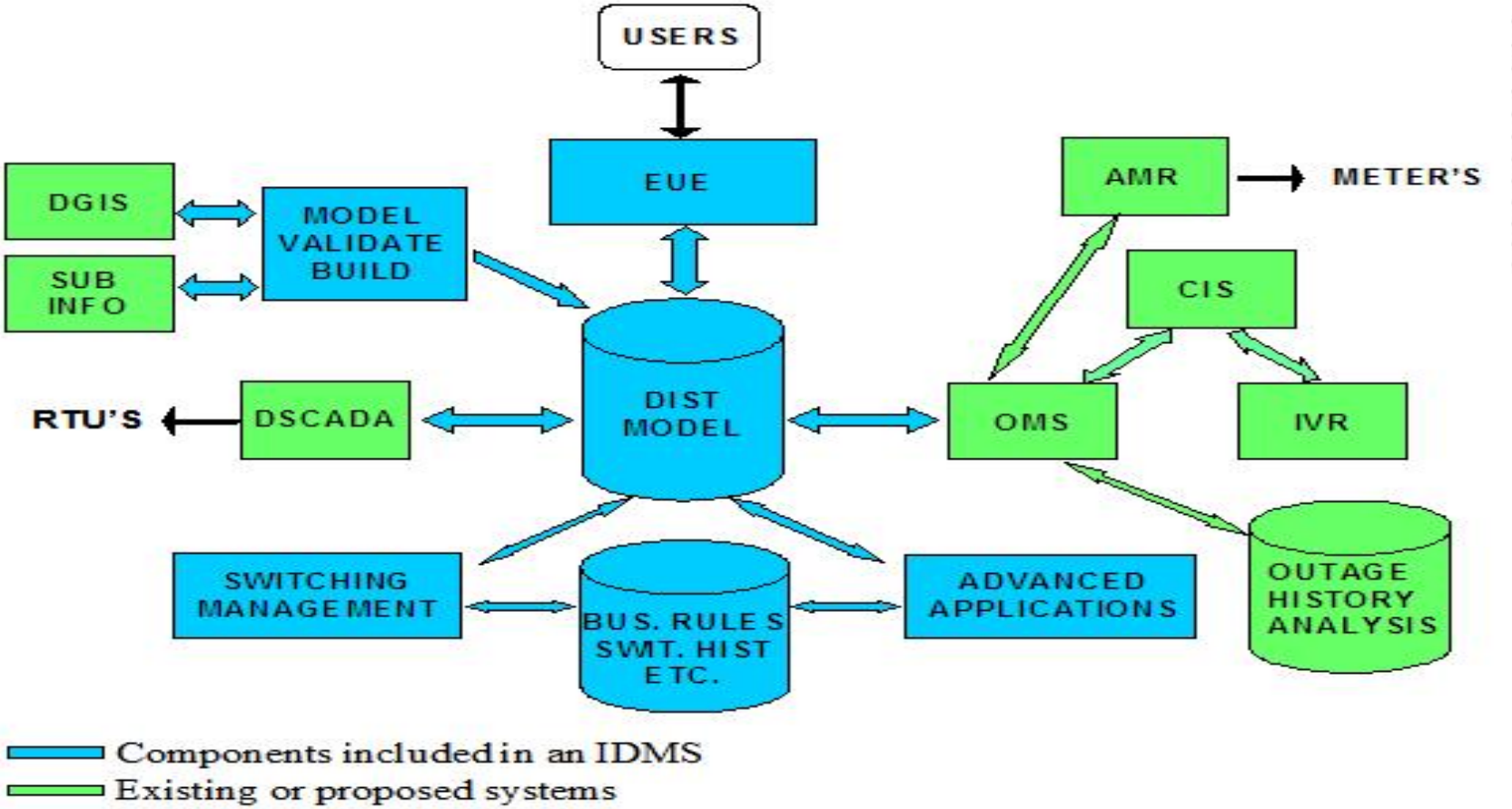

PEACHTREE
F1678-AFD
Piedmont Hospital
Tanyard Creek Park
Ardmore Park
Atlanta
Peachtree Creek
Colonial Homes Dr NW
Peachtree Park Dr NE
Redland Rd NW
Collier Rd NW
Peachtree Rd NE
Peachtree Valley Rd NW
Camden Rd NE
Ardmore Rd NW
28th St NW
Palisades Rd NE
F1678-AFD
Huntington Rd NE
Northeast Expy NE
Buford Hwy
Horace E Tate Fwy
Northside Circle NW
Peachtree St NE
Amtrak-Atl
Beverly Rd NE
Ansley Golf

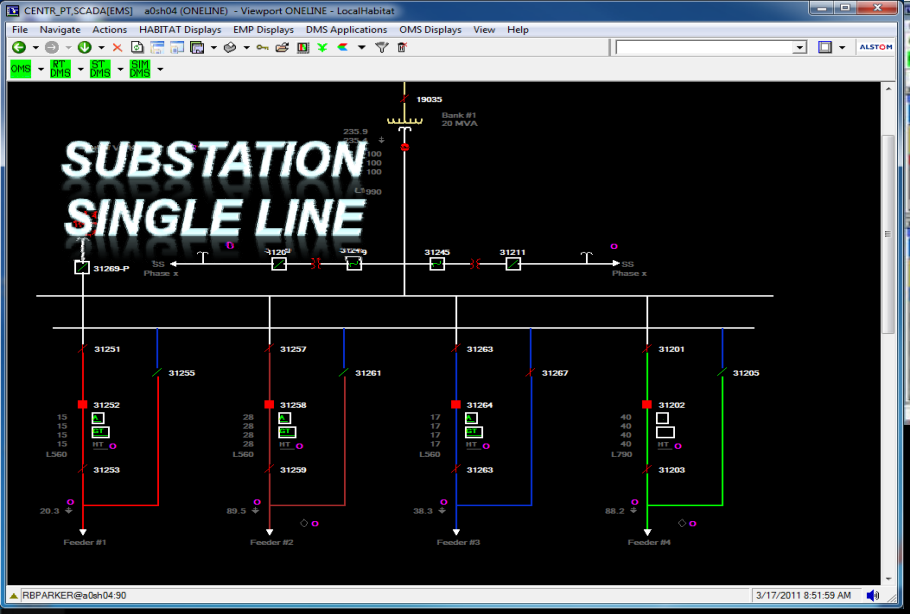
Systems Integration Strategies

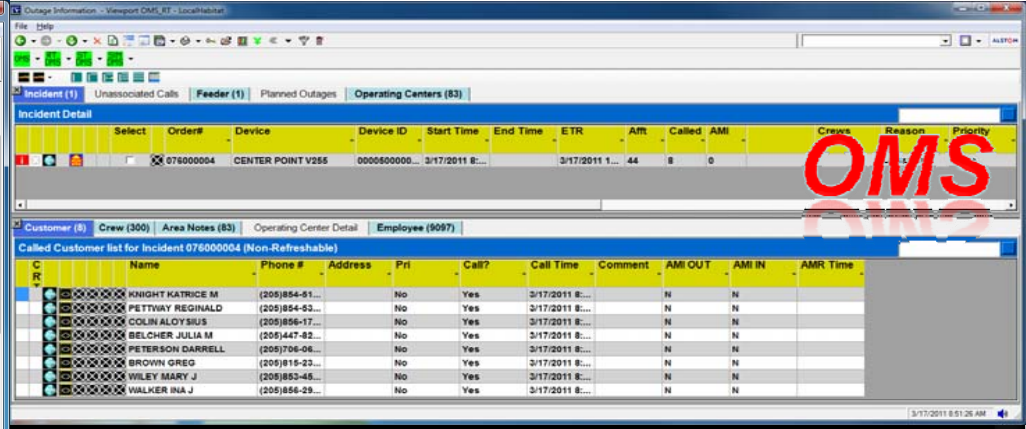
- **Integrated Distribution Management System (IDMS)**
  - APC project currently in development
  - New Outage Management System to be integrated with SCADA
  - Provides a **single user interface** for control center operators
  - Will optimize system performance
  - Includes new operator training simulator
  - Will turn huge amount of *data* into *information*

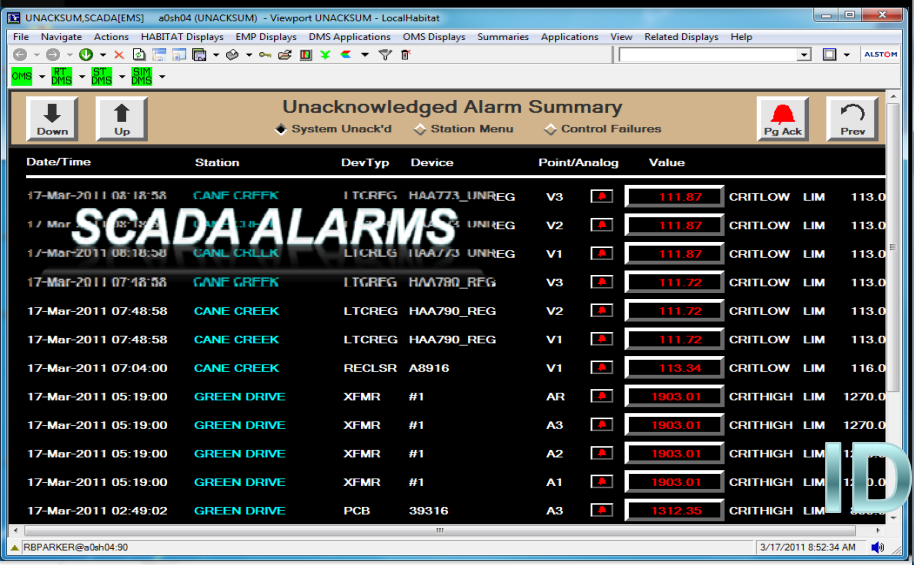
Systems Integration Strategies

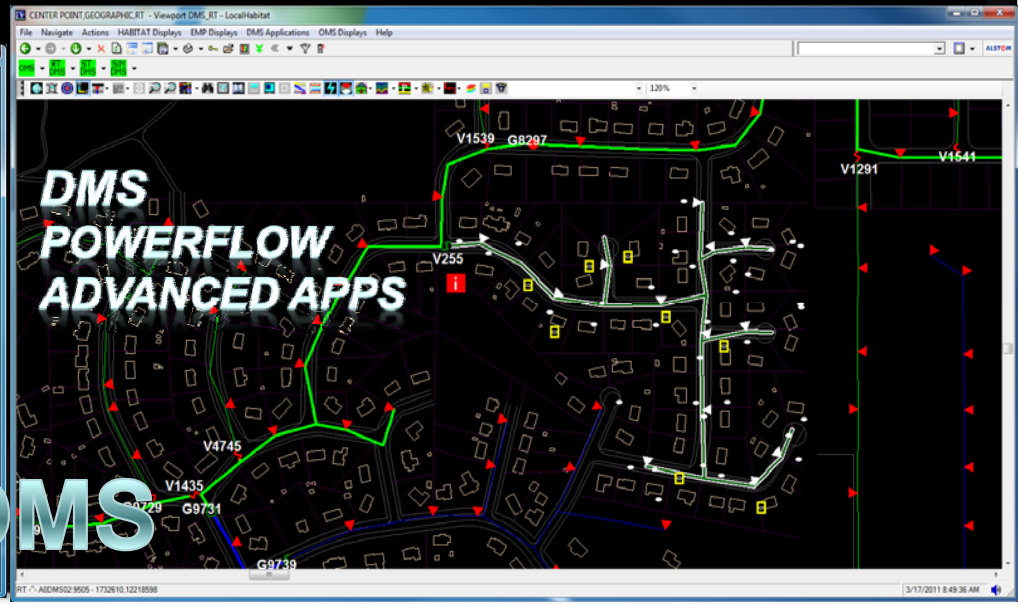
- Integrated Distribution Management System











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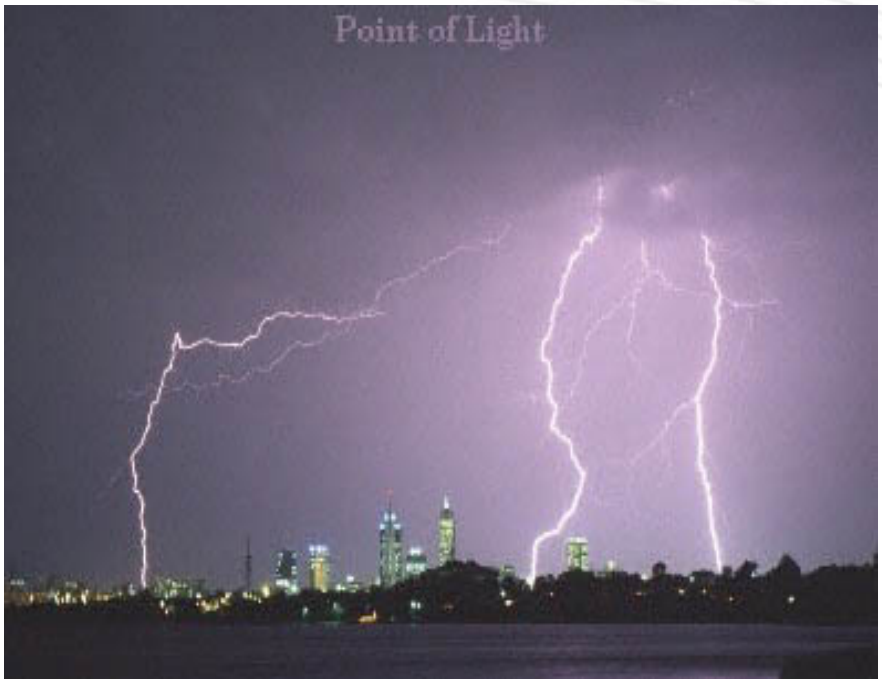
IDMS Functionalities

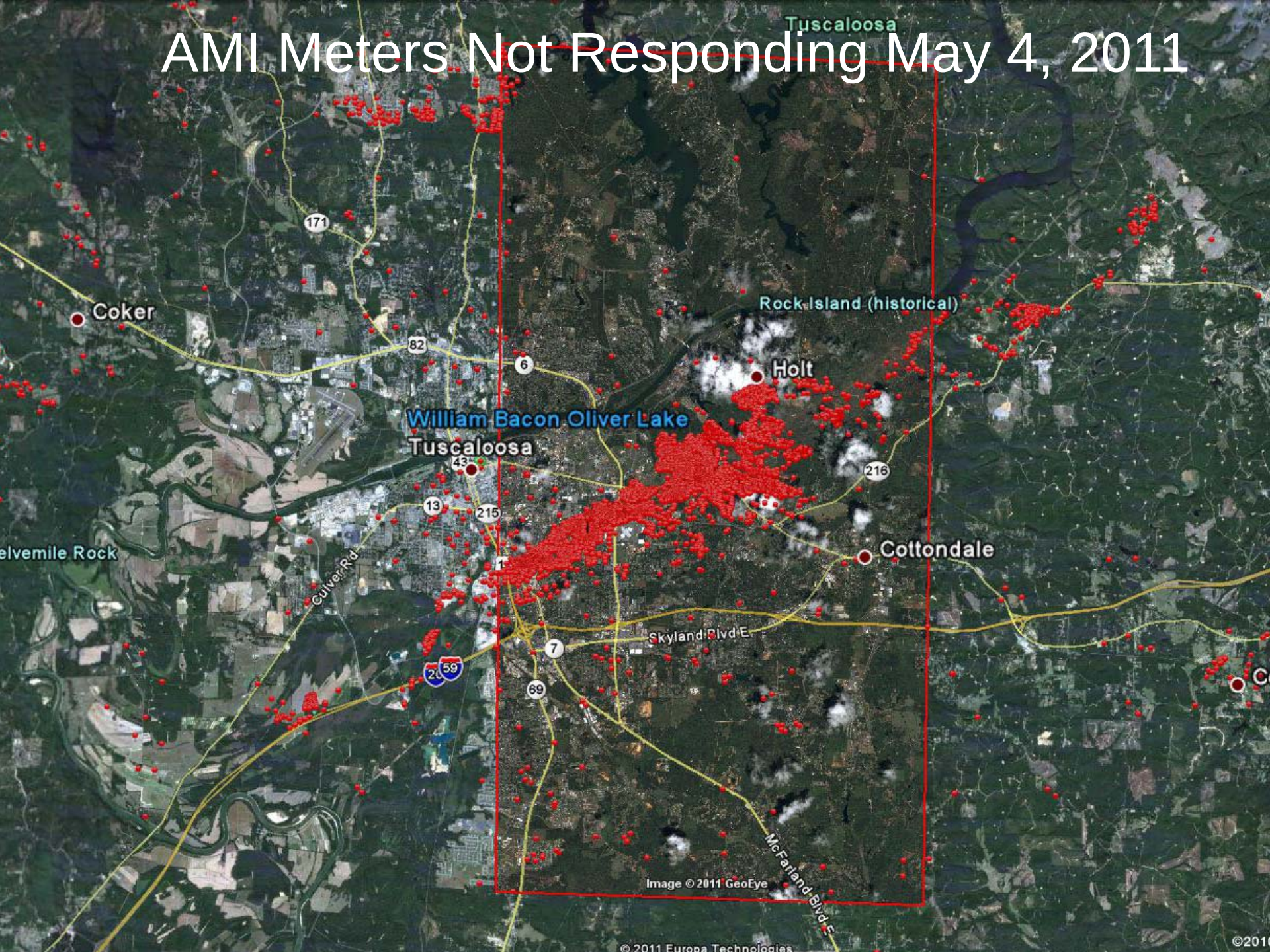
- Protection scheme validation
- Enhanced data visualization
- Automated switching management
- Contingency analysis
- Voltage optimization
- Power flow optimization
- Automated fault location

Systems Integration Strategies

- AMI – Outage Management Integration
  - Improve outage communication
  - Restoration notification during storms to reduce customer callbacks and restoration crew efficiency



AMI Meters Not Responding May 4, 2011



Energy Efficiency Strategies

- Loss reduction initiatives
  - EPRI Green Circuits initiative – monitor / measure impacts and benefits of Distribution efficiency
- Remote capacitor monitoring
- Power flow optimization
- Conservation Voltage Reduction (CVR)
  - 250 MW expansion at GPC
  - 200 MW at APC
  - MPC pilot

Asset Management

- Substation Equipment Monitors
  - Improve maintenance efficiencies and decrease failures
    - DGA monitors
    - Transformer monitors
    - Bushing monitors
    - Battery monitors
- Relay Modernization

Smart Grid 2010 - 2013

Switch Yard

Communication Towers
20 Additional Sites

Residence or
Business Meter

4.5 Million

2 Million

Automated Switch
2657 - 4443

Automated Switch
1688 - 2047

Monitored
Capacitor
1144 - 9454

Substation

Electronic Relay
5420 - 7283

Transmission
Control Center

Harris EMS → State-of-Art EMS

Distribution
Control Center

Multi-Platform
Multi-OMS → IDMS

SCS - SGIG Program Overview

Project	Device	APC	GPC	Gulf	MPC	Totals
DEEP	Capacitor Banks	185	1,700		34	**1,919**
	Capacitor Bank Monitors	2,153	5,100		68	**7,321**
	Regulator Controls	198	2,700		17	**2,915**
	Re-conductoring (in miles)	47.6				**47.6**
	Voltage Conversions (in MVA)	95				**95**
IDMS - SCADA	IDMS – SCADA	100%	100%	100%	100%	
	Smart Relays		824			**824**
Distribution Automation	Smart Reclosers / Smart Switches	735	610	312	96	**1,753**
	Self Healing Networks	148	150	7	16	**321**
	Fault Indicators	150	311			**461**
	Base Radio sites	90	20			**110**
Transmission Line Automation	115 kV Transmission Switches	162	9			**171**
	46 kV Transmission Switches	269	18			**287**
Smart Substations	Smart Substations	193	28	20	118	**359**

Smart Grid Challenges

- Cyber Security
  - Regulations under development
- Interoperability Standards
  - Concern over legacy equipment
  - New standards could increase costs
  - Standards could provide efficiency in the long run

Summary

- Much focus on Smart Grid and energy efficiency
- Southern Company is a leader in Smart Grid deployment
- AMI deployment will offer active customer participation in energy purchase decision-making
- IDMS initiative will showcase the benefits of systems integration
- Initiatives will be prioritized on a cost / benefit basis
- Stimulus funding will accelerate deployment

Questions?

Distributed Generation / Energy Storage Strategies

- Monitor industry innovations
- Support research in solar technologies in the southeast
  - EPRI pilot – pole mounted panels
- Support interconnection process for small generators
- Study the impacts of electric vehicles to the system

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Distributed Generation / Energy Storage Strategies

- SoCo Research, EPRI, and two other utilities set to demo a TransFlow 2000
- 500kW, 2.8MWh, 480V 3φ output
- ZnBr Flow Battery with an estimated 30 yr life
- Transportable

Distribution Energy Efficiency Program (DEEP)

DEEP Project Objectives:

- Increase the efficiency of the distribution system
- Decrease line losses
- Improve system power factor
- Provide VARs for the system to offset generation requirements
- Reduce maintenance costs

The investments include:

- Installation of new capacitor banks
- Monitoring of new and existing capacitors
- Installation of Automated regulator controls
  - Increasing the capability of Conservation Voltage Reduction (CVR)
- Reconductoring distribution lines
- Voltage conversions

Integrated Distribution Management System (IDMS) / Supervisory Control and Data Acquisition (SCADA)

IDMS / SCADA Project Objectives:

- Deploy a full function Distribution Management System
- Improve system reliability
- Increase the efficiency of the distribution system
- Deploy a uniform SCADA platform for all operating companies
- Decrease outage times

The investments include:

- Development and deployment of the IDMS system at Alabama Power Company
- New Supervisory Control and Data Acquisition (SCADA) platforms for all operating companies
- Deployment of an automated Fault Location System

Distribution Automation (DA)

Distribution Automation (DA) Project Objectives:

- Deploy automated line devices and communication to devices
- Increase the reliability of the Distribution System
- Reduce outages and outage duration
- Reduce outage restoration costs

The investments include:

- Smart reclosers and Smart switches on distribution feeders
  - Communication equipment on these automated line devices to enable SCADA control
- Remote fault indicators to sense and report faults
- Automatic Fault Isolation and Restoration Schemes (Self-Healing Networks)
- Additional base radio sites to enable communications to these additional devices

Transmission Line Automation (TLA)

Transmission Line (TLA) Project Objectives:

- Increase the reliability of the Transmission System by reducing outage durations
- Reduce outage restoration costs

The investments include:

- Upgrading existing line switches with programmable motor-operators.
- Installing new line switch/programmable motor-operator units.
- Mounting new remote energy flow sensing devices.

Smart Substations

Smart Substations Project Objectives:

- Increase the reliability of the Transmission System
- Modernize existing protection substation schemes
- Reduce equipment failure
- Reduce equipment maintenance costs
- Reduce outage restoration costs

Smart Substations

The investments include:

- Replacement of existing electromechanical protection devices with MP-based devices.
  - Transmission and Distribution line relaying and substation equipment protection schemes
- Addition of circuit breakers to substations to provide a standard protection scheme for the transmission line network.
- Addition of Substation Integration Automation (SIA) in transmission substations
  - Enhance ability to remotely acquire and analyze information equipment status and system events.
- Replacement of current system event recorders with new technology digital fault and event recorders as well as the addition of Digital Fault Recorders (DFR)
- Addition of MP-based devices to continuously monitor the condition of large power transformers, breakers, and battery systems.
  - Continuous Dissolved Gas Analysis (DGA) monitors
  - Bushing monitors
  - Breaker monitors
  - Battery System monitors
  - Sulfur Hexafluoride (SF6) monitors
  - Transformer temperature monitors