



# *Southern Company Smart Grid Strategy*

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# Southern Company Smart Grid Strategy

## Smart Power



## SO smart

## Smart Grid



**CUSTOMERS**



**Smart Choices**



# Southern Company Smart Grid Strategy

## Smart Grid

### Transmission and Distribution



## *Industry Perspective: Smart Grid Fever*

- *Public and political attention on Smart Grid is at an all time high*
- *Smart Grid is seen as the great enabler:*
  - *Concern over the Electric Grid's ability to meet future customer load, reliability, and power quality demands*
  - *Nationwide Environmental focus – demand reduction, energy reduction, CO2 and other GHG's reduction*
  - *Concern over national security – physical and cyber threats*
  - *AMI initiatives*
  - *Vendors, consultants, conference organizers - \$\$\$\$\$*

# Southern Company Smart Grid Strategy

*What is a Smart Grid? Depends on who you ask...*

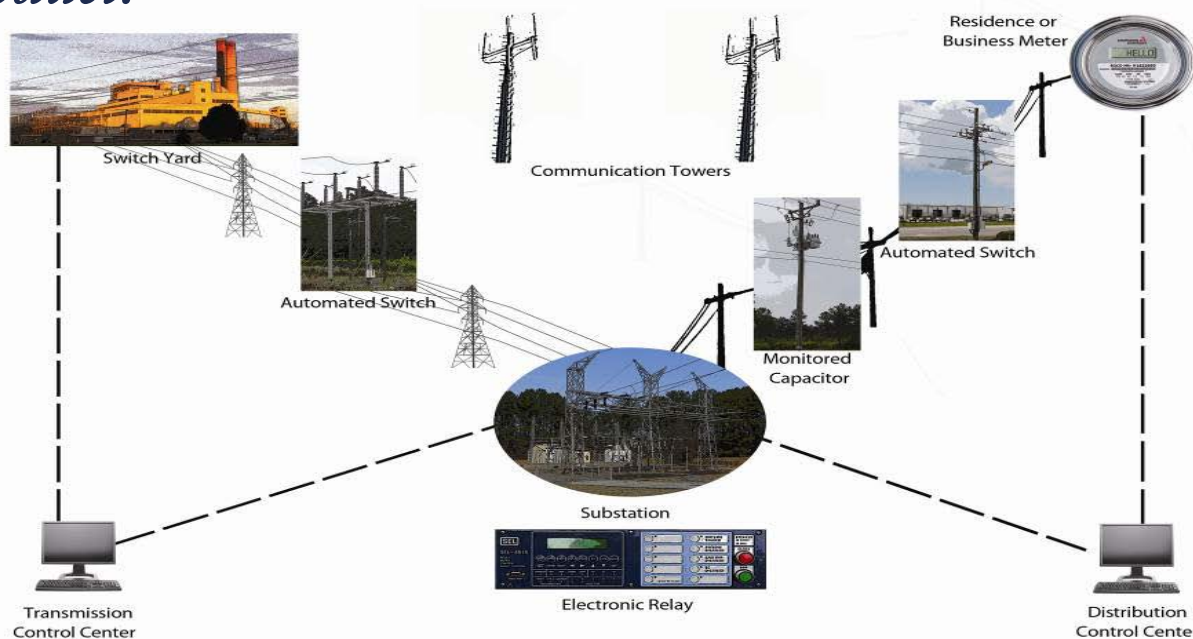
- *Two-way meters? Smart thermostats*
- *Intelligent home appliances*
- *Self-Healing Networks*
- *Improved power quality*
- *Improved grid energy efficiency and grid mgt*
- *Sensors to monitor equipment*
- *Distributed and renewable resources? wind farms / solar panels / PHEV's / Battery Storage*
- *Greater reliance on renewable resources*
- *Integration of renewables to the Smart Grid*



# Southern Company Smart Grid Strategy

*A Smart Grid, to Southern Company, is a two-way telecommunication-enabled power delivery system that uses electronic data/information, intelligent devices, integrated systems, and advanced metering, to*

- *Optimize grid performance and reliability*
- *Provide the customer enhanced options to improve the efficient use of our product.*



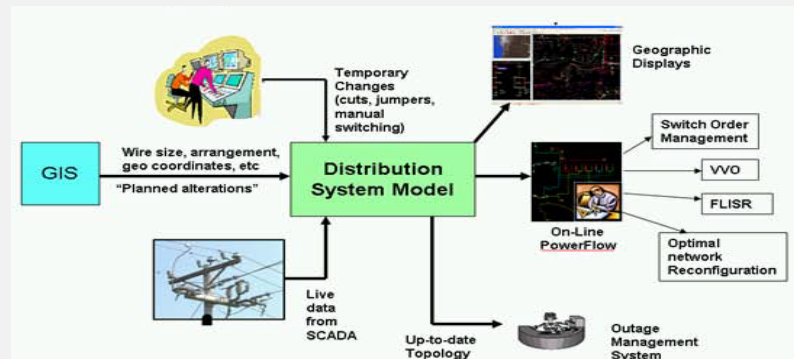
# Southern Company Smart Grid Strategy

- *SCADA – Deployed in over 90% of substations*
- *Significant amount of IED's (Intelligent Electronic Devices)*
- *Transmission and Distribution Automation*
  - *SCADA controlled line devices – regulators, reclosers, capacitors, switches – 20+ years*
  - *De-centralized Automated Fault Isolation and Restoration Schemes – Self Healing Networks*
- *Fault, harmonic, and waveform data retrieval*



# Southern Company Smart Grid Strategy

## Transmission and Distribution Strategies



- *Reliability Strategies*
- *Integration Strategies*
- *Energy Efficiency Strategies*
- *Communication Strategies*

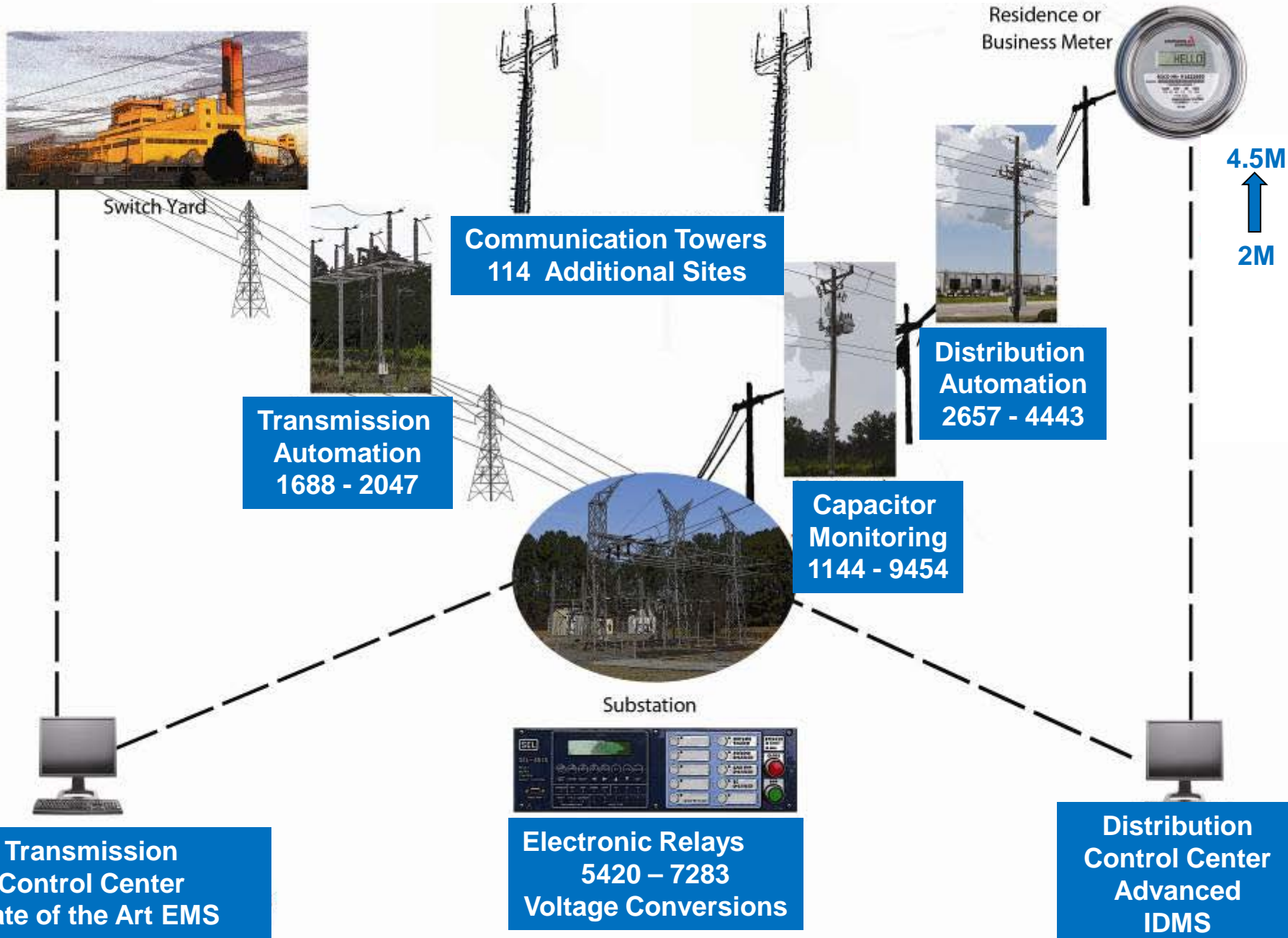
# Southern Company DOE Smart Grid Investment Grant

<i>SGIG DOE Program Areas</i>	<i>Cost</i>	<i>Reliability</i>	<i>Integration</i>	<i>Communication</i>	<i>Energy Efficiency</i>
<i>Transmission Line Automation</i>	<i>\$21M</i>	<i>X</i>	<i>X</i>	<i>X</i>	
<i>Distribution Line Automation</i>	<i>\$69M</i>	<i>X</i>	<i>X</i>	<i>X</i>	
<i>Smart Substations</i>	<i>\$122M</i>	<i>X</i>	<i>X</i>	<i>X</i>	
<i>Distribution Energy Efficiency</i>	<i>\$73M</i>	<i>X</i>	<i>X</i>	<i>X</i>	<i>X</i>
<i>IDMS / SCADA Fault Locating</i>	<i>\$45M</i>	<i>X</i>	<i>X</i>	<i>X</i>	<i>X</i>
<i>Total SGIG Program Cost</i>	<i>\$330M</i>				

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<i>DOE Funding</i>	<i>\$165M</i>	<p><u>Disclaimer:</u> "This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or</p>			
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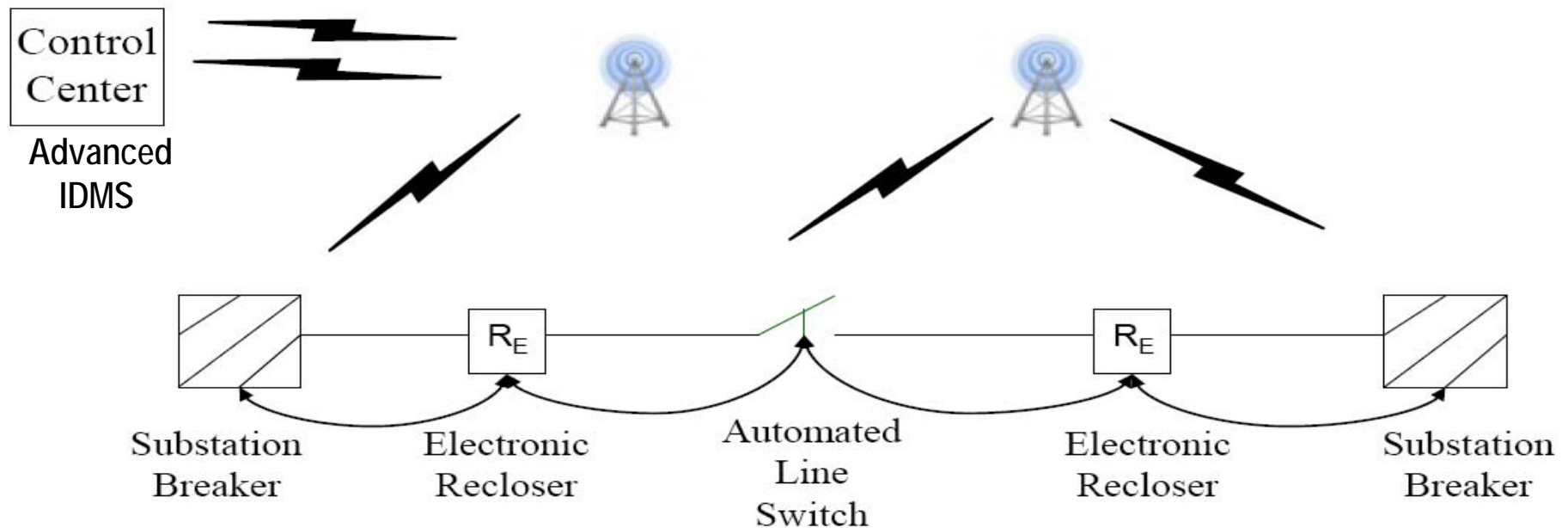
# T & D Smart Grid 2010 - 2013



# Southern Company Smart Grid Strategy

## Smart Grid Reliability and Integration Strategies

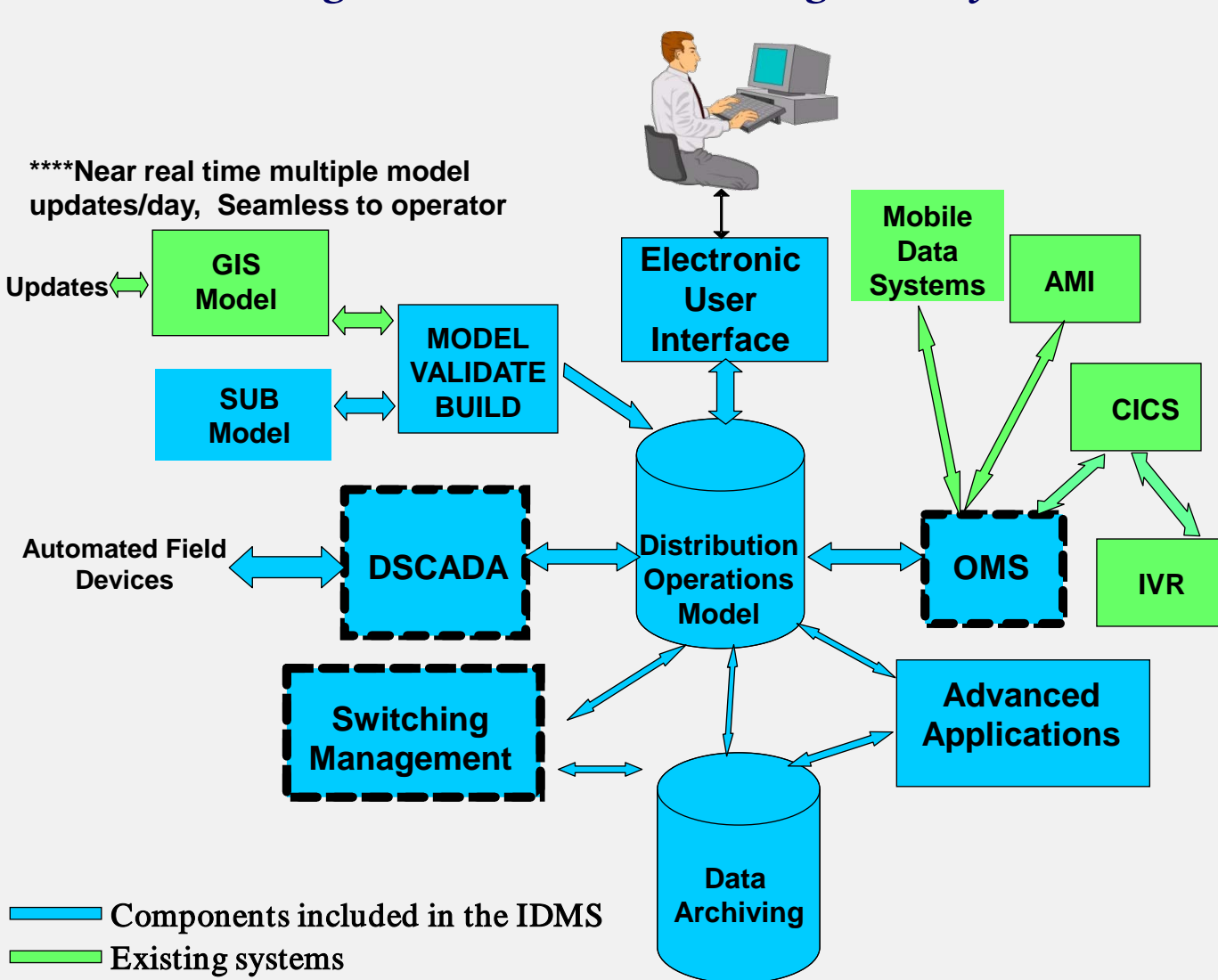
- Increase number of intelligent devices – switches, line sensors, fault detection, equipment sensors on infrastructure
- Expand deployment of automatic restoration schemes and Self Healing Networks.



# Southern Company Smart Grid Strategy

## Smart Grid Reliability and Integration Strategies

### Integrated Distribution Management System (IDMS)



- Demand management
- Fault locating & presentation
- Network optimization
- Enhanced visualization of events
- AFISR (Self healing)
- Contingency analysis
- Automated switching management
- Real time network power flow
- Management of distributed generation
- Distribution Training Simulator

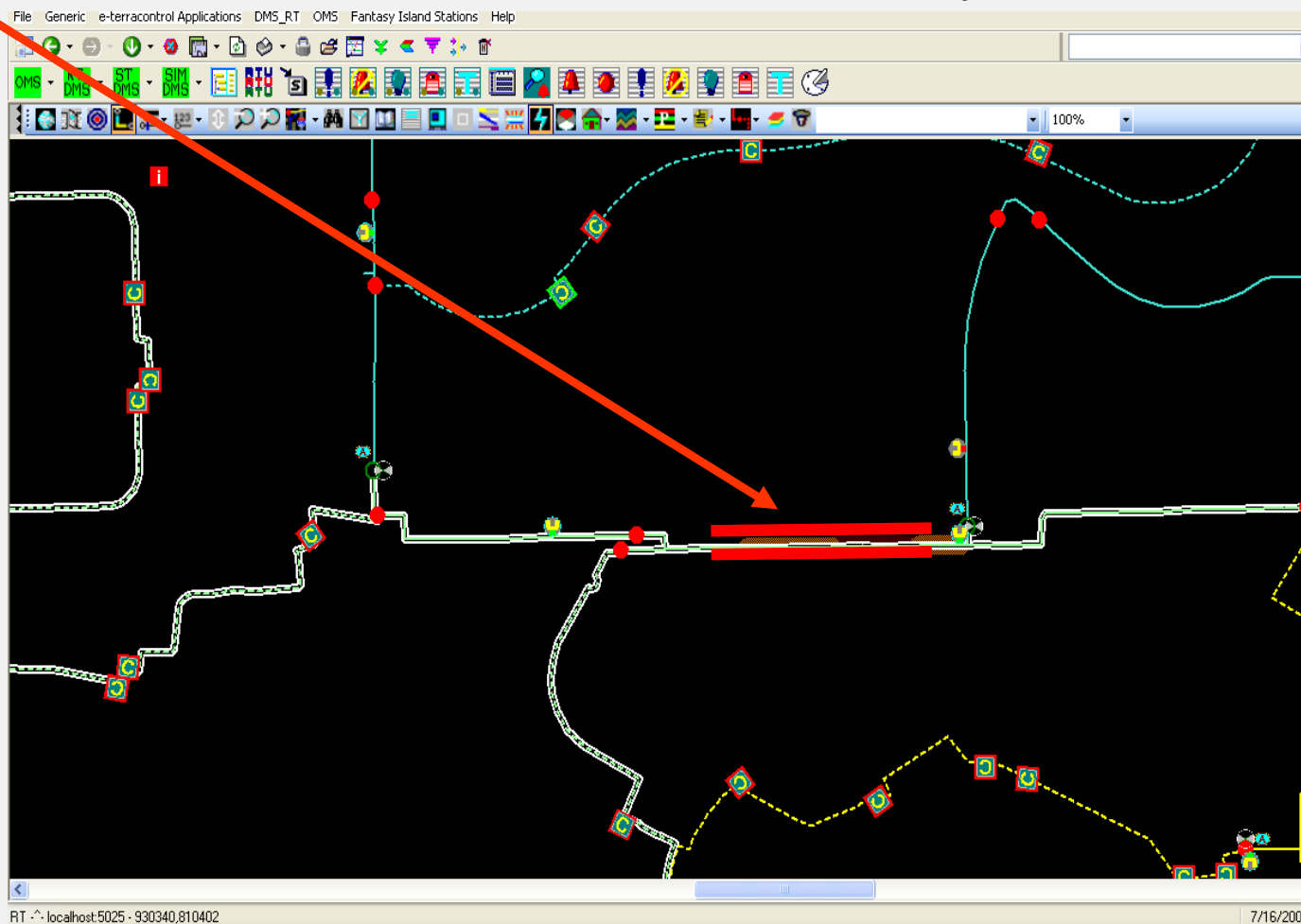
# Southern Company Smart Grid Strategy

## IDMS Fault Location Analysis

*System can pinpoint location of faults using real time SCADA and fault sensor data*

*Darker shaded area is most probable location*

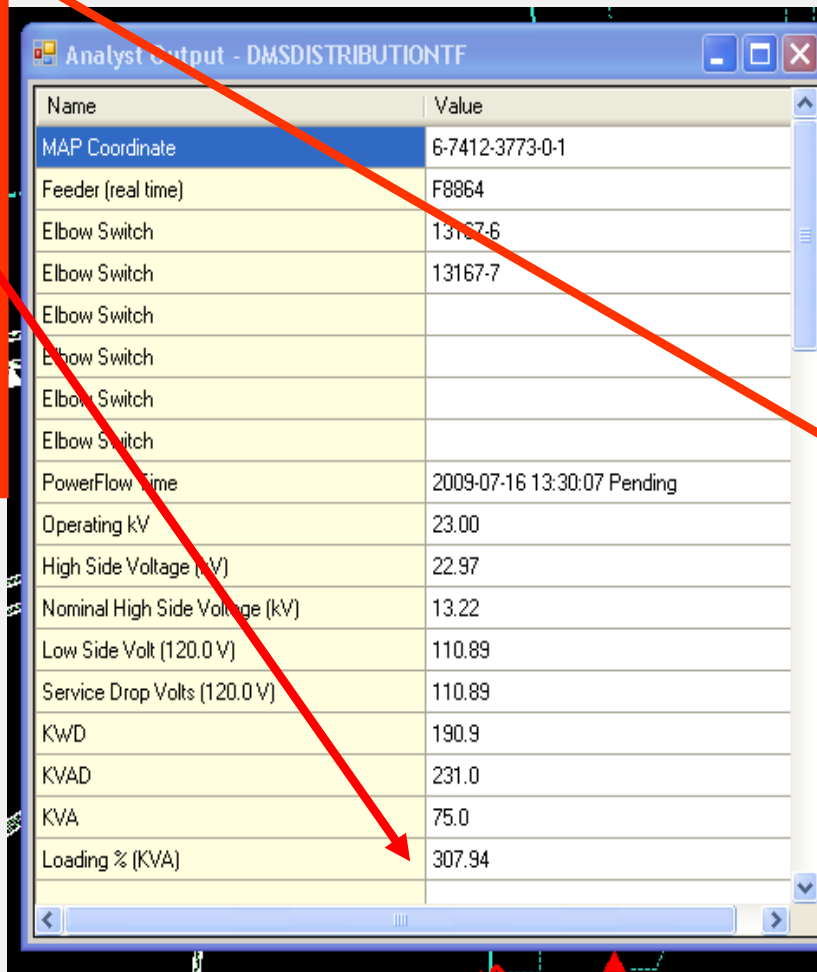
*Crews can be dispatched directly to fault*



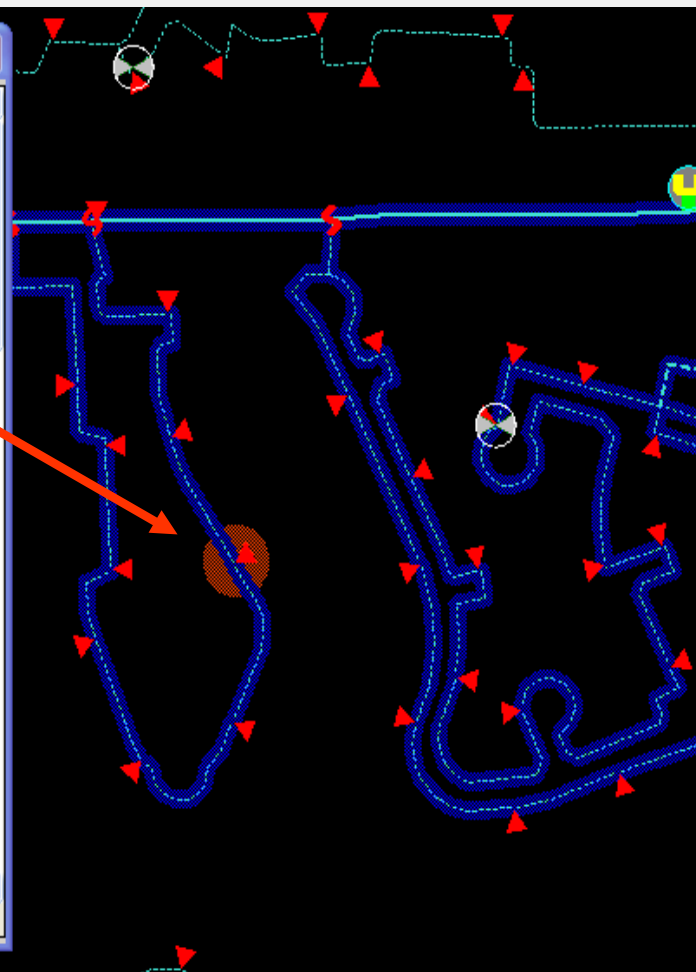
# Southern Company Smart Grid Strategy

## IDMS Voltage and Overload Violations

*System graphically denotes overloaded sections and/or transformers using real time analysis*

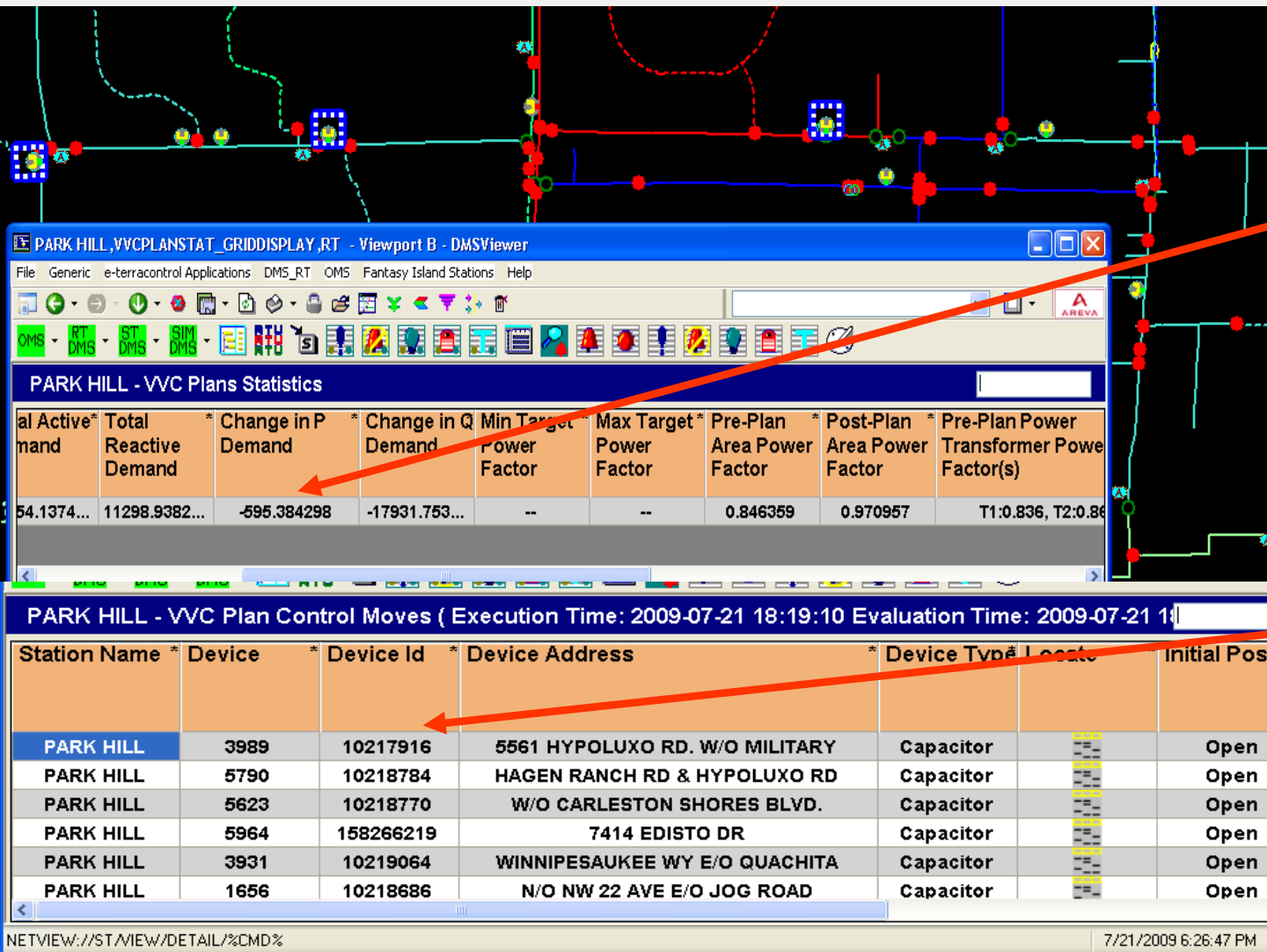


Name	Value
MAP Coordinate	6-7412-3773-0-1
Feeder (real time)	F8864
Elbow Switch	13167-6
Elbow Switch	13167-7
Elbow Switch	
Elbow Switch	
Elbow Switch	
Elbow Switch	
Elbow Switch	
PowerFlow Time	2009-07-16 13:30:07 Pending
Operating kV	23.00
High Side Voltage (kV)	22.97
Nominal High Side Voltage (kV)	13.22
Low Side Volt (120.0 V)	110.89
Service Drop Volts (120.0 V)	110.89
KWD	190.9
KVAD	231.0
KVA	75.0
Loading % (KVA)	307.94



# Southern Company Smart Grid Strategy

## IDMS Demand Reduction



*System calculates demand reduction*

*System utilizes current state of network to determine optimal capacitor controls*

# Southern Company Smart Grid Strategy

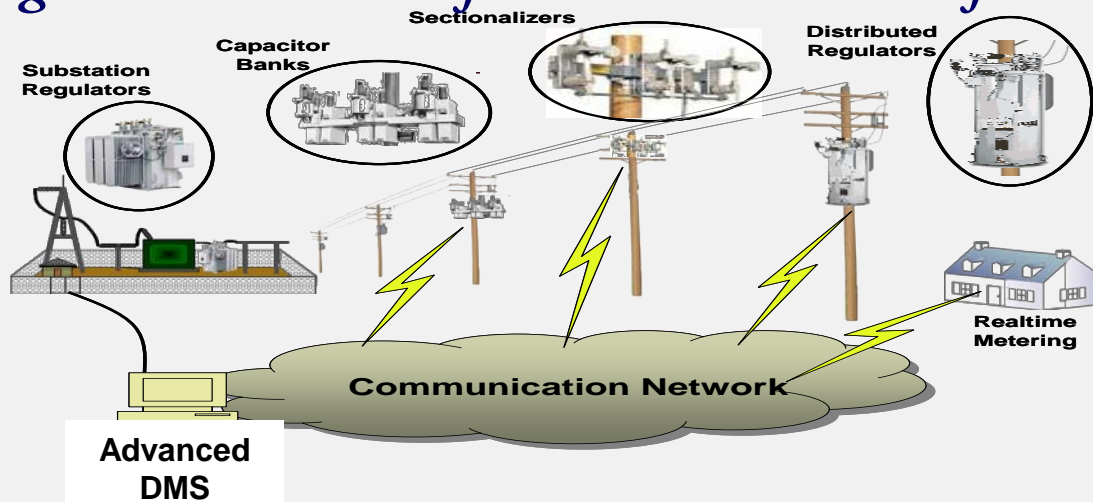
## Smart Grid Energy Efficiency Strategies

- *System loss reduction initiatives*
  - *EPRI Green Circuits (Var improvements, circuit balancing, circuit re-conductoring, efficient transformers)*
- *Remote capacitor monitoring*
- *Network optimization to reduce system losses*
- *Voltage conversions*
- *250 MW Conservation Voltage Reduction (CVR) expansion at GPC, IDMS at APC – 180MW, CVR pilot at MPC*
- *AMI deployment to 4.5M customers by 2012 for new customer options*
- *AMI – TOU, Critical Peak pricing, RT pricing, A/C Run Time control pricing*



# Smart Grid Communication Strategy

- *Utilize existing internal MAS, Frame Relay and SoLINC*
- *Fiber network – multiple fiber rings*
- *Utilize wireless peer to peer communications*
- *AMI FlexNet network for specific applications(AMI, fault detection, meter outage reporting)*
- *Evaluating commercial carrier networks*
  - *Must meet required service level support*
- *Participate in industry developments and FCC/NIST standards*
- *No single “silver bullet” for communications for Smart Grid*



# Southern Company Smart Grid Strategy

