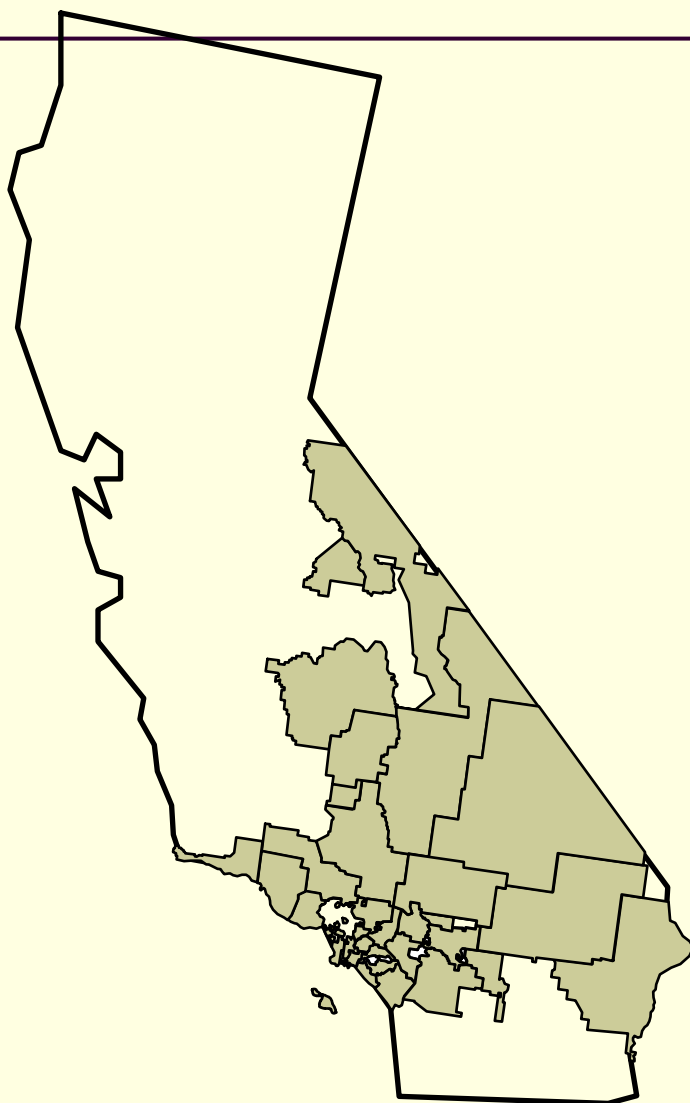


SCE's Smart Grid Update

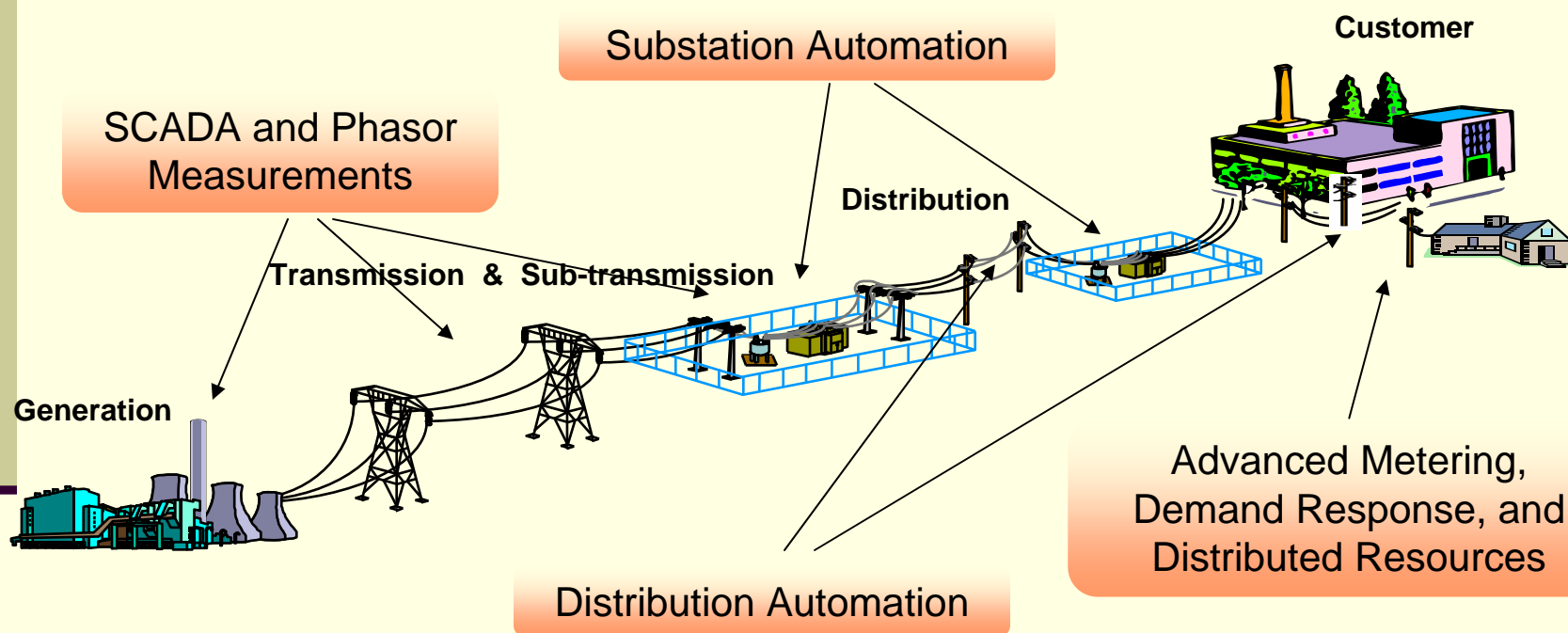
Bob Yinger
Southern California Edison
October 15, 2007

Southern California Edison



- 50,000 square miles
- ~23,000 MW peak demand
- 4.7 million customers
- 11 million people served
- 845 cities and communities

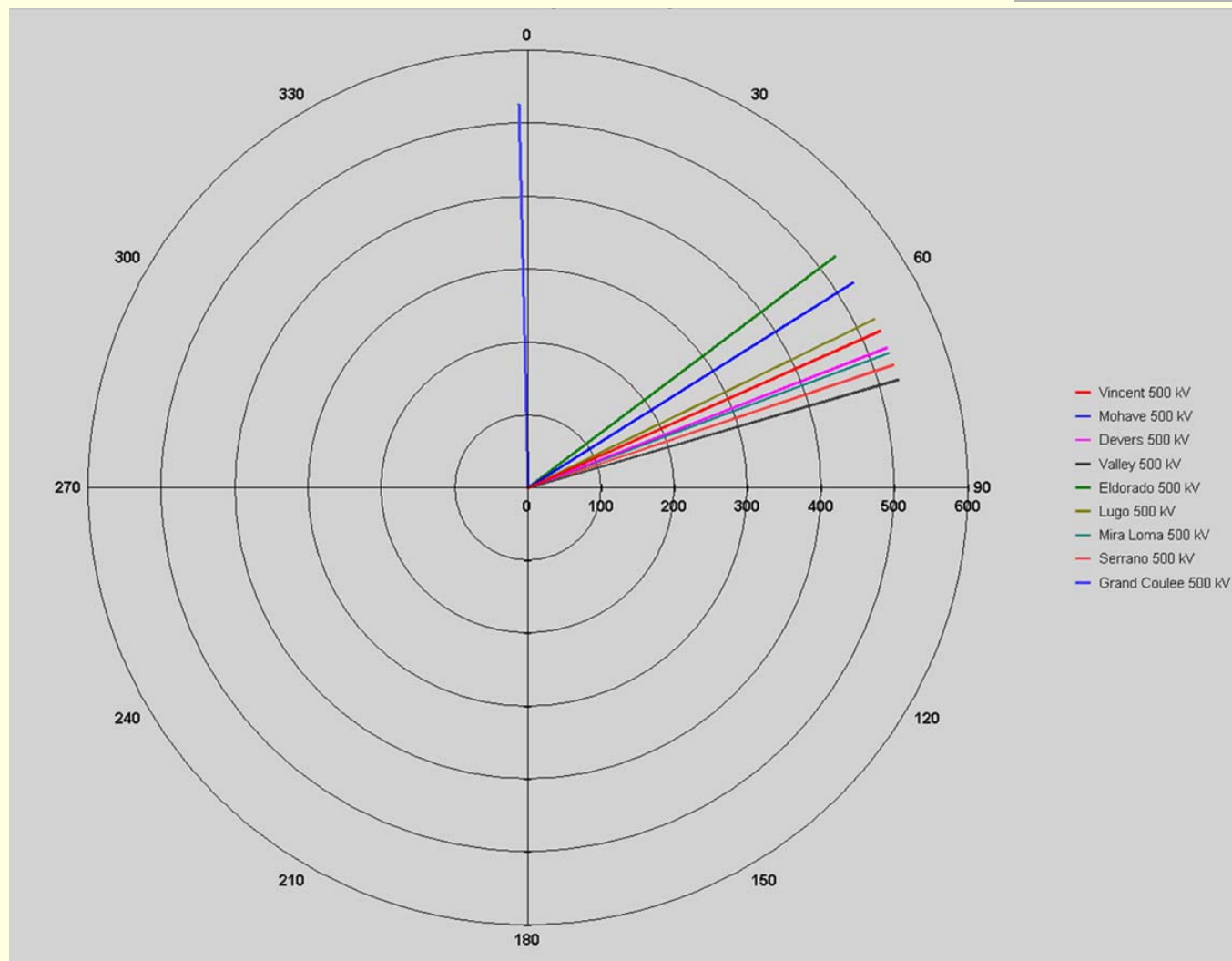
SCE Smart Grid Activities



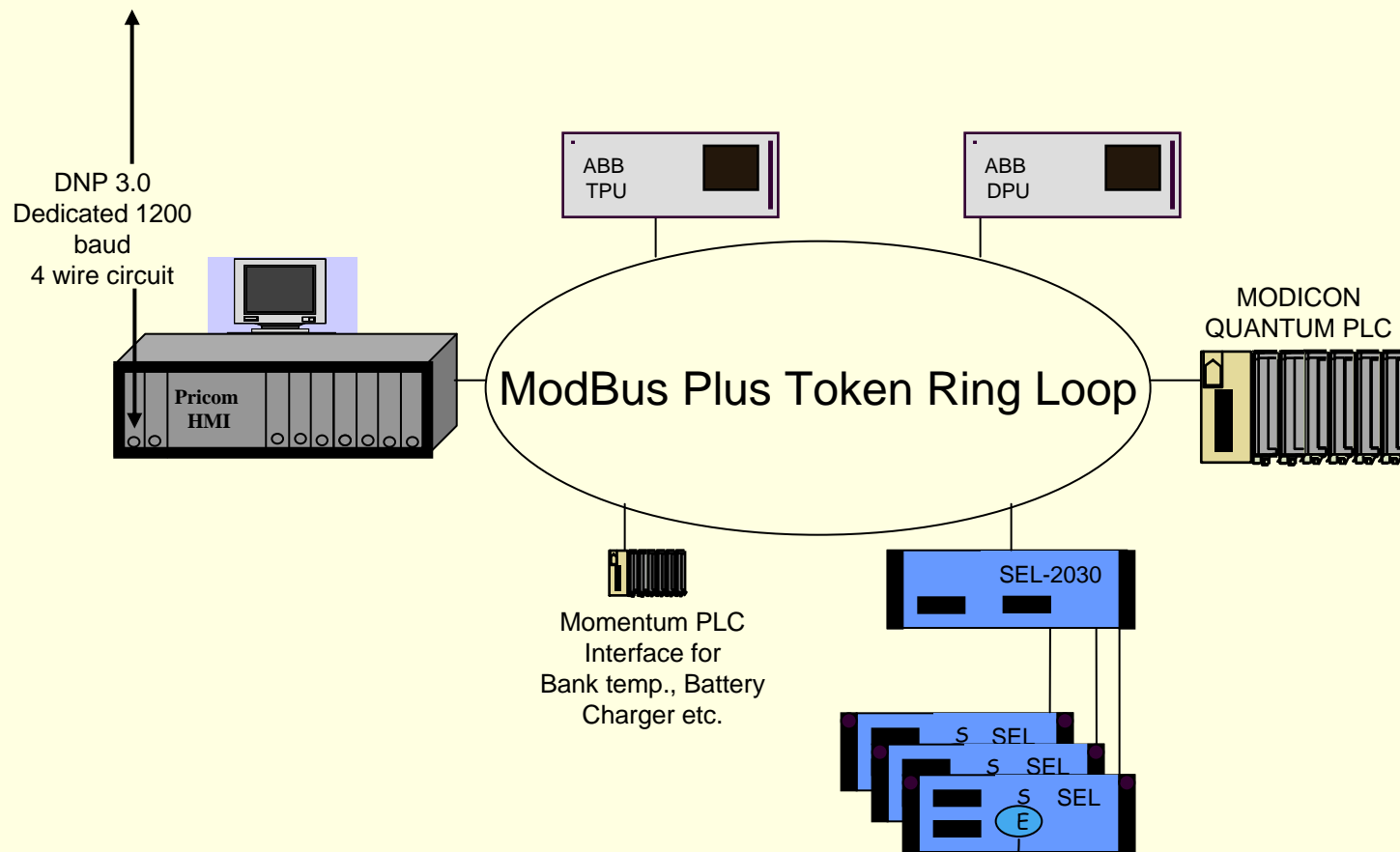
Phasor Measurement Unit

- Provides
 - Real-time system monitoring for reliability and post event analysis
 - Control for system components (e.g. FACTS, HVDC)
 - Integration with existing SCADA/ EMS systems
 - Info. to avoid blackouts like ones in the Northeast and West
 - Situational awareness on event locations and severity
 - Info. to facilitate system restoration after disturbance
- SCE is working with WECC members and SCE neighbors like APS, SRP, PG&E, LADWP and WAPA for data exchange

Phase Angles: July 24, 2006 event



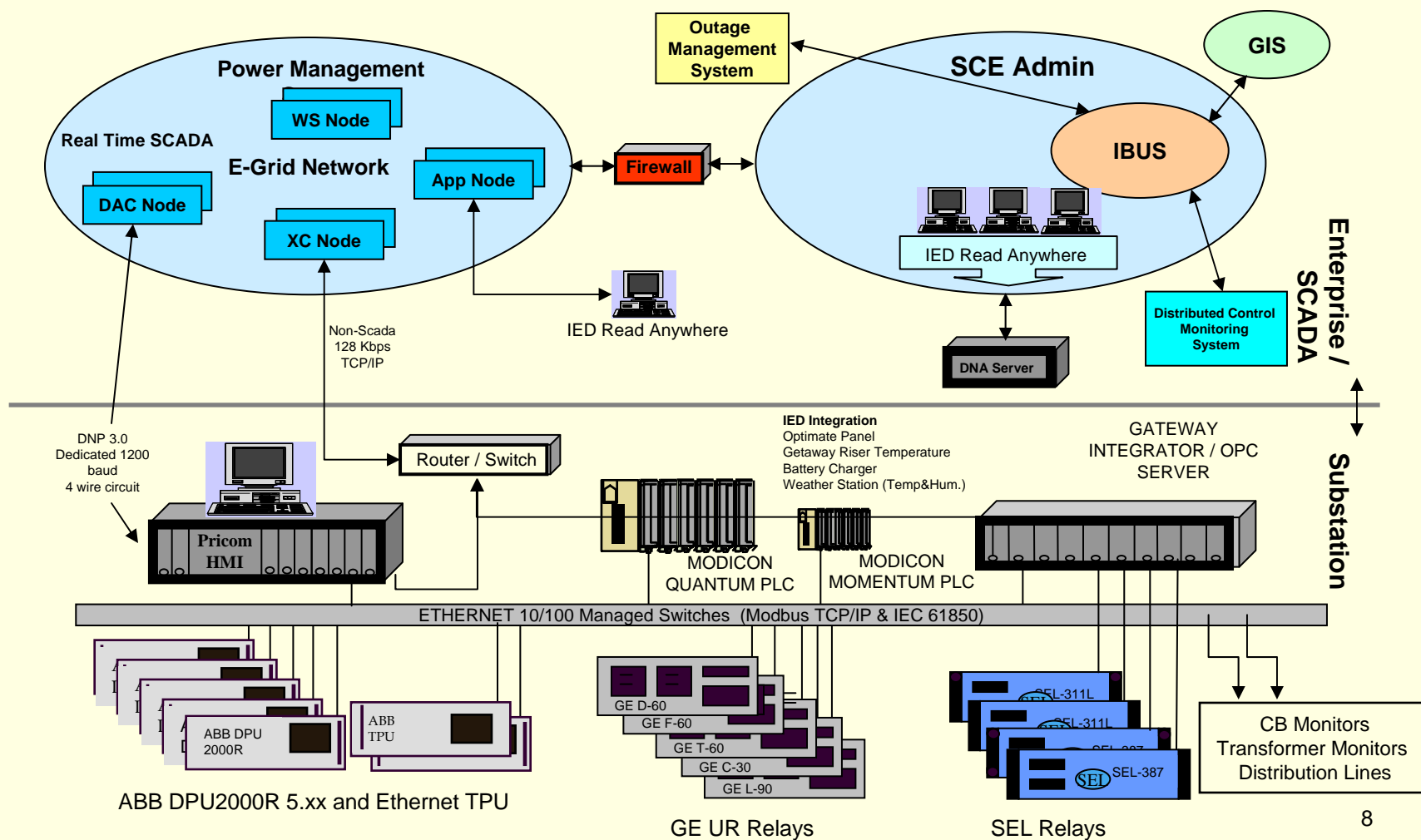
Old Substation Automation



New Sub. Auto. Objectives

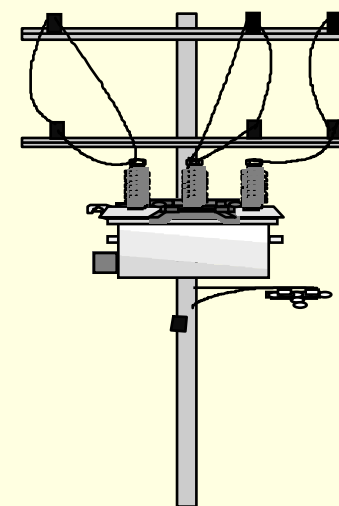
- Open System local network
 - Ethernet/ ModBus
 - Multi-vendor equipment
 - Support future standards (IEC 61850)
 - Topology supports interfacing with legacy systems
- Dedicated HMI
 - Local Control
 - Remote SCADA control
- Gateway for 'beyond SCADA' data
 - Securable pathway

New Substation Automation



Distribution Automation

- Distribution Switches (2773)
 - On 1611 of 4300 circuits
- Sub-transmission Switches (57)
 - 66 kV and 115 kV
- Automatic Reclosers (984)
- Circuit Alarms (324)
- Capacitor Controls (8273 of 9500)
- Remote Fault Indicators (148)
- Load Survey meters (8500)
- Large Customer meters (4500)



Distribution Automation

- New applications:
 - Vacuum Fault Interrupters
 - Automated P/E (Auto Transfer)
 - Automated Distribution Regulators
 - Intelligent Fault Indicators
 - Distribution Automatic Restoration System
 - Network Protectors

Distribution Automation

- All distribution automation presently accomplished through the use of CellNet Utilinet radios
 - Spread spectrum, peer-to-peer
- Some meter reading/ load survey functions will be replaced by Advanced Metering (SmartConnect™)

The Circuit of the Future (CoF)

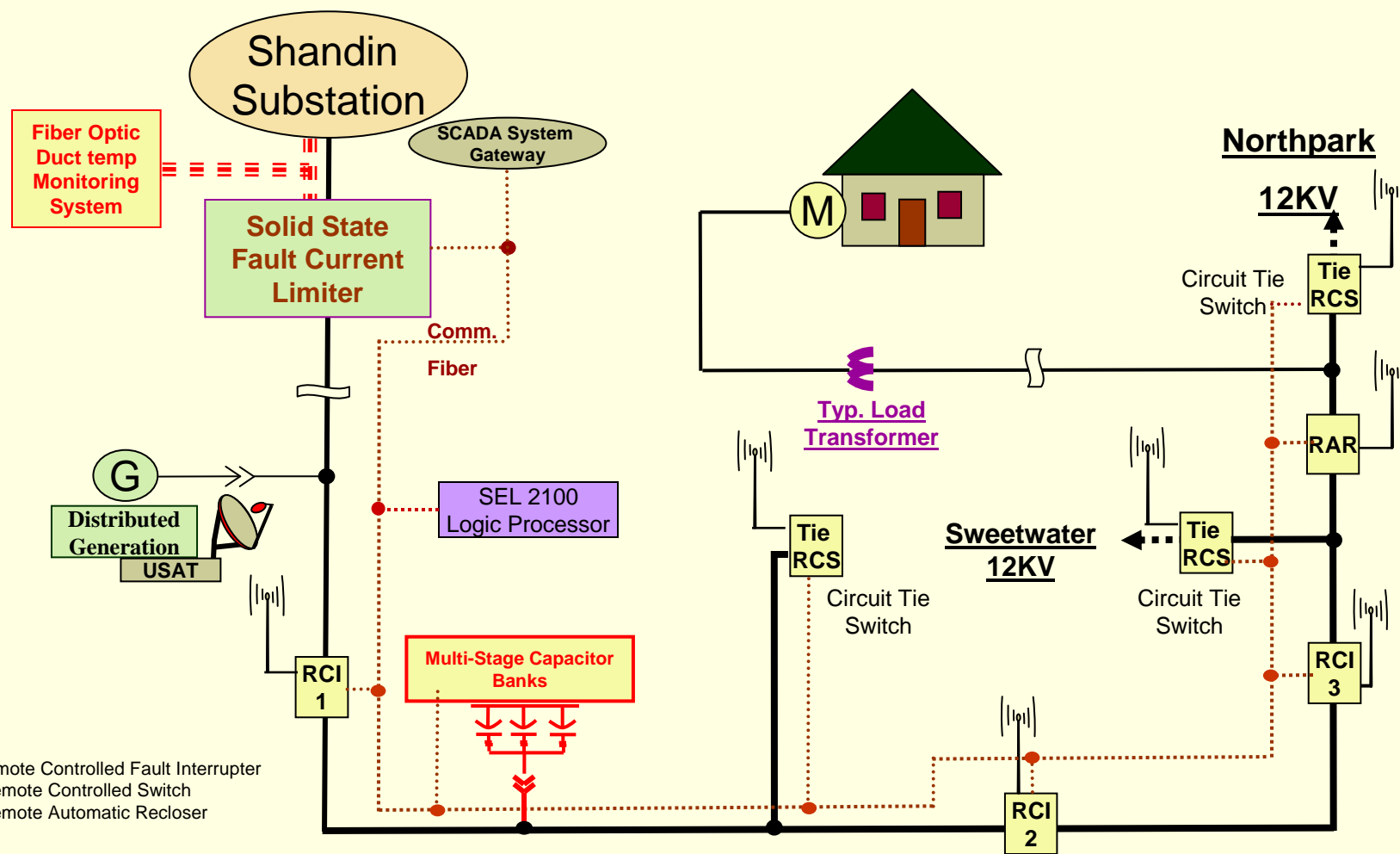
- SCE has identified a need to come up with new ideas to build more reliable and efficient distribution circuits
 - Provide customers with better service
 - Improve safety
 - Reduce costs

Location of CoF

- New circuit
- Will serve approximately 2,000 customers
- Overhead / Underground facilities
- New hardware and protection schemes
- High speed communications
- Approximately 23,000 amps fault duty



CoF Features



RCI = Remote Controlled Fault Interrupter
RCS = Remote Controlled Switch
RAR = Remote Automatic Recloser

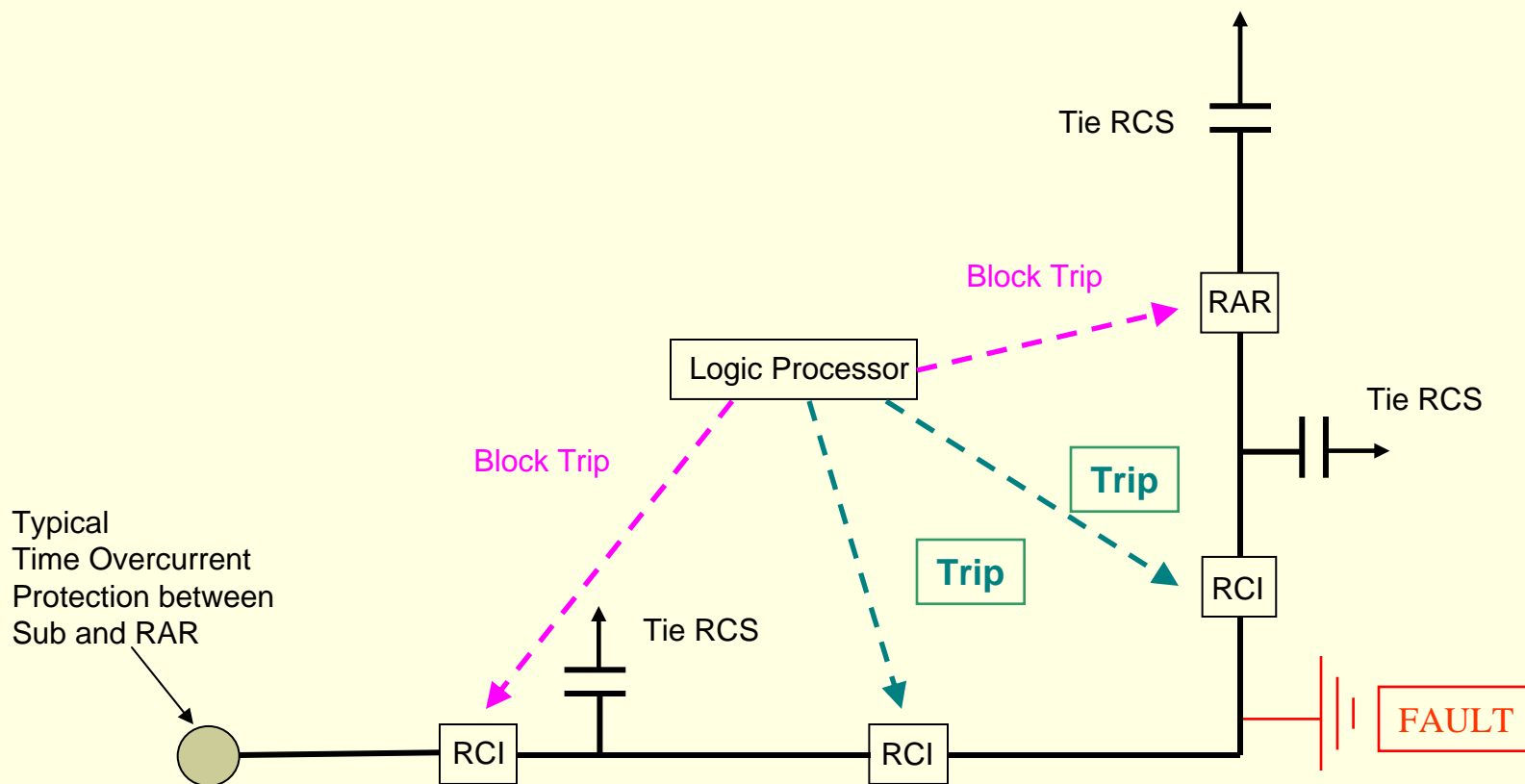
CoF Schedule

- Initial operation began on August 14, 2007
- Entering testing phase
- Future phases will test other advanced devices
 - 2008 – Fault current limiter, multi-stage cap
 - 2009 and beyond – other new concepts

DOE Advanced Protection

- Advanced protection methods on the Circuit of the Future (CoF)
- Three tasks over 3 years:
 - Evaluation of new protection scheme on CoF
 - Design and evaluation of protection scheme with fault current limiter on CoF
 - Develop and test advanced fault location, sensing and prediction methods on CoF

New Protection Scheme



Distributed Generation/ Storage

- Interconnection point for dist. generation or storage on CoF
- Investigate distributed gen/storage (plug-in-hybrid)
- Benefits:
 - Supplement the feeder during high load conditions
 - Voltage/ VAR support



SmartConnect (Advanced Metering Infrastructure)

■ Enable Energy Smart Customers

- Integrated information from utility
- Payment options (e.g., pre-payment)
- Outage & service condition information
- Support rate option innovations

■ Manage Distributed Resources

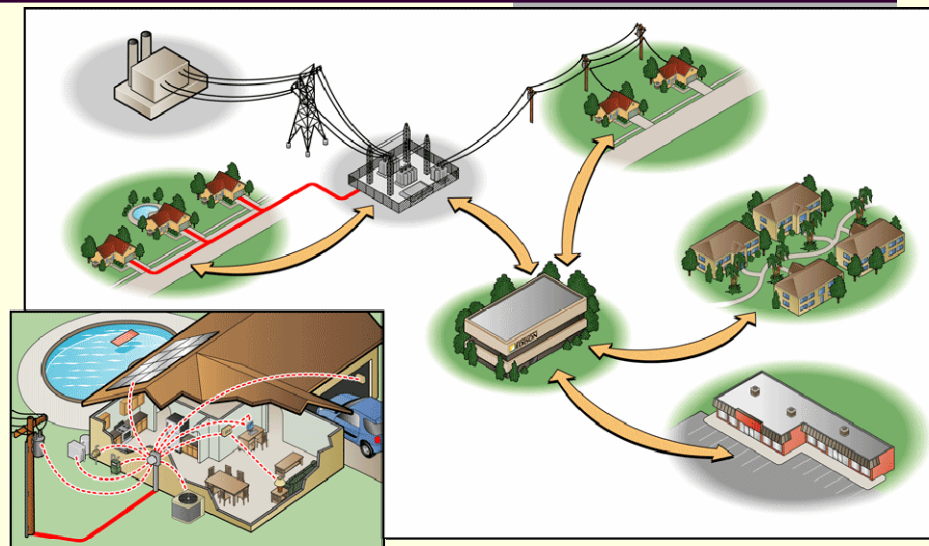
- Economic dispatch of load resources
- Dispatch of load for grid management
- Intelligent net metering

■ Operational Efficiencies

- Field communication links to distribution
- Revenue cycle improvements
- Situational data in near real-time
- Wholesale - retail markets integration

■ Built with the future in mind

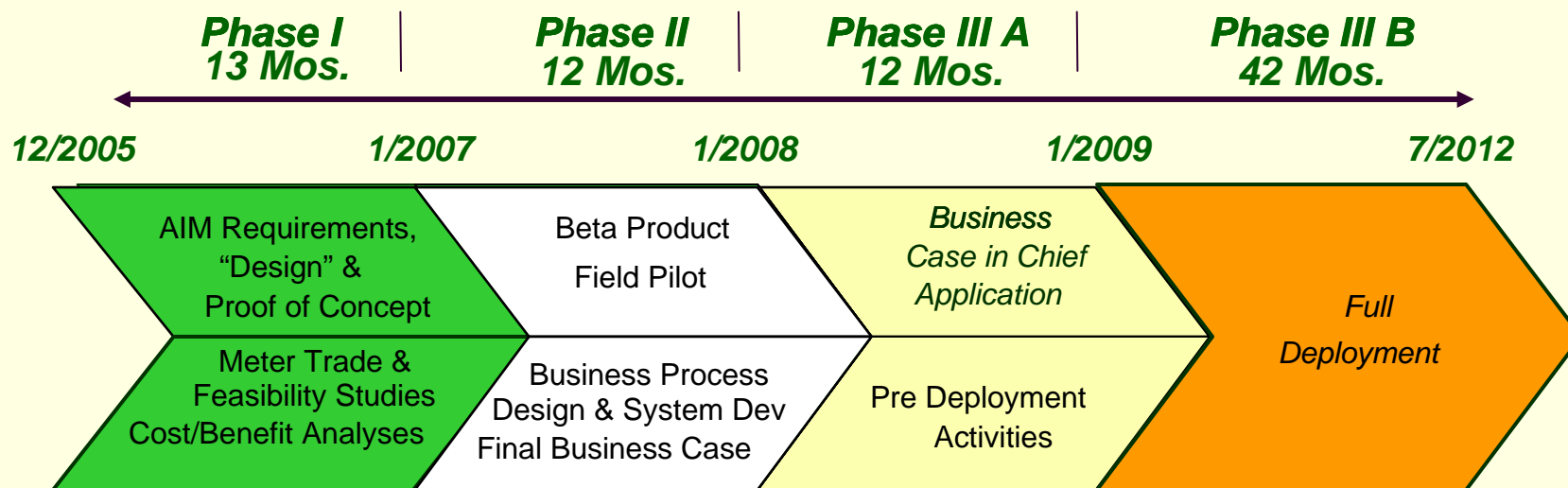
- Upgradeable WAN/HAN communications
- Leverage open architecture principles in system design
- Future customer service offerings



SCE seeks to leverage a 2-way communications infrastructure with 5 million intelligent metering devices on our distribution network to create lasting value for our customers and our operations

SmartConnect Program Phases

AMI Program will use a multi-phased approach to development and deployment of a next generation advanced metering infrastructure over a 6 ½ year timeframe.



SCE Smart Grid Program Goals

- Provide advanced visualization for operators and planners
- Provide information for maintenance
- Implement advanced protection techniques
- Better outage detection/ quicker restoration
- Better load management abilities
- Increased distributed generation and storage
- Better grid and cyber security
- Improve safety

What Needed to Accomplish

- Integrate “islands of automation”
- Standardize protocols for communications and data transfer
- Construct common databases
- Install advanced sensors
- Improve cross-system communications
- Implement advanced hardware
- Provide system-wide view of security

Questions?

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