

# Time Utilization at Southern California Edison

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# Existing Time Stamp Sources

- Substations
  - GPS Receivers connected to substation equipment
  - Multiple Receivers in substation likely
- Outside Substations
  - 20 year old wireless network – propagation through proprietary technology to DA end points
  - Source GPS receiver distributed through NTP
- Grid Data Centers
  - GPS Receiver
  - Distributed by NTP

# Existing Time Applications

## 1) Time Stamp on Power System Quantities:

- Distribution Management System
  - Time Stamped by FAN radio at time of sampling
- Energy Management System Historian
  - Time Stamped by Server Received Time
  - Quantities Dead banded
- Synchro-phasor Quantities
  - Time Stamped at Data Source
  - All values stored at data rate with time value

# Post Event Analysis

## 2) Post Event Analysis:

- Relay event records time stamped in field
- Digital Fault Recorder (DFR) event records time stamped in field
- Time Alignment via GPS Time Stamp



# Required Grid Management Capabilities



## Monitor

- Real Time Situational Awareness
- Power Quality Awareness
- Distribution Load Flow Analysis

## Control

- Auto Circuit Reconfiguration
- DER Dispatch
- Micro-grid Management

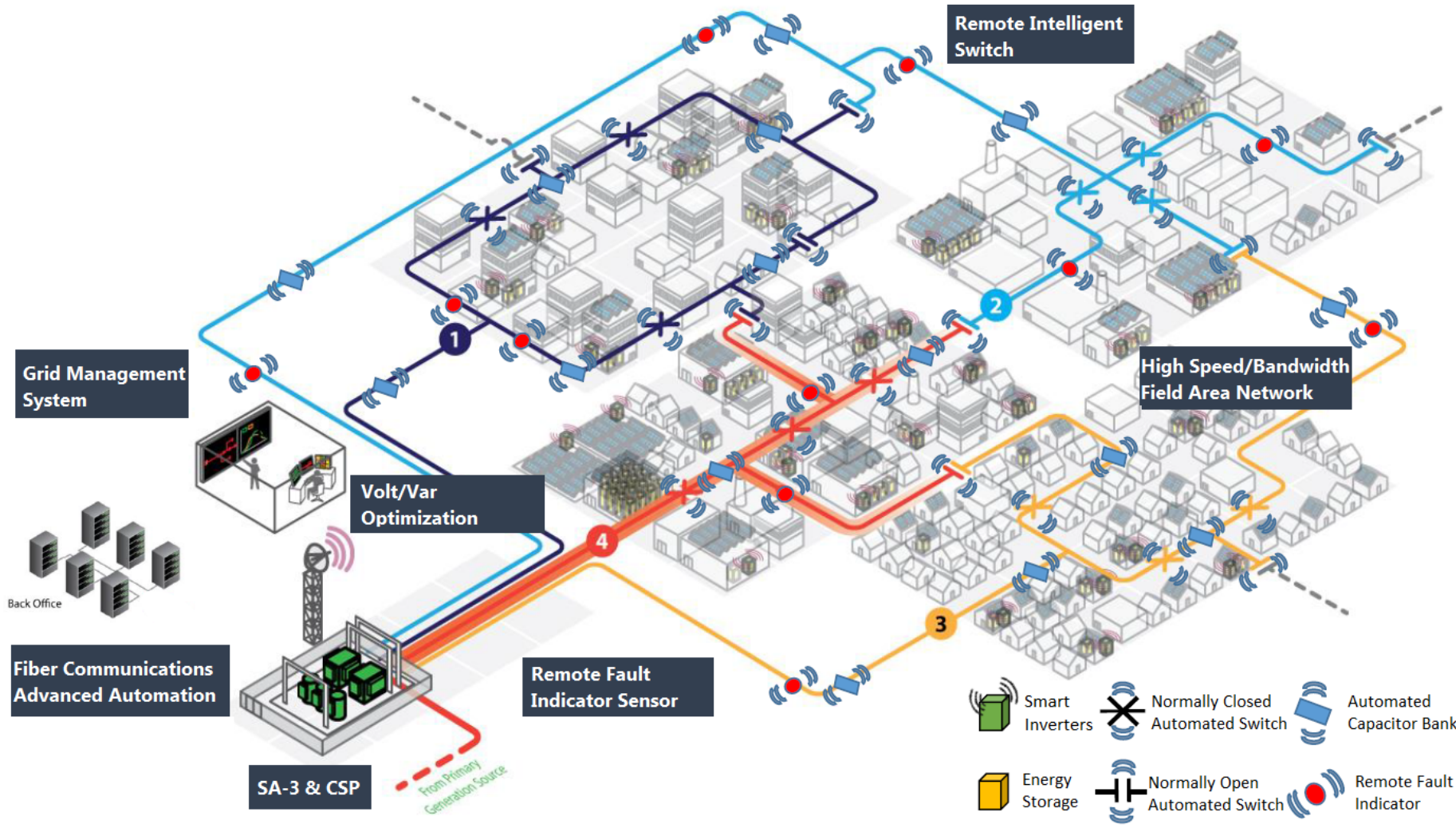
## Predict

- Short term DER Forecasting
- Long Term DER Forecasting
- Contingency Analysis

## Optimize

- Power Flow Optimizations
- Adaptable Protection

# Grid Modernization Technology Overview



# Time Synchronized Control Applications

- Adaptive Protection
- Circuit Reconfigurations
- DER Control
- Optimization
- Microgrids
- Advanced RT Power System Applications