Time Utilization
at
Southern California Edison

Brenden Russell, Principal Advisor
Anthony Johnson, Consulting Engineer

Anthony.Johnson@sce.com
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