Playas Power Grid

Design Requirements and Desired Features
Background

Original Configuration
Current Configuration
Original Configuration

- Three-phase power served at “Pool Area” and “Town Center”
- Split into single-phase branches to provide power to homes
Current Configuration

- Town primarily runs on “Phase A”
- Majority of “Field Lab” unpowered
Design Requirements

Utility Grid
Critical Power Service
Experimental Grid
Utility Grid

• Power as a utility service
• Ease of access throughout Playas
  • No dead zones
  • Standard headroom for future needs
• Robust distribution system
  • “Real-world” distribution on a small scale
  • Three-phase throughout Playas
  • Any single-phase as an accessible branch throughout
Critical Power Service

• Specified nodes have critical services
• Need secondary grid-tied Uninterrupted Power Supply or equivalent
• Network/security scale (does not need backup generators)
Experimental Grid

- Safe for experimentation while independent from utility grid
- Separate power grid which coexists at multiple intermediate levels with utility power grid
  - Loads with smart switches select between utility or experimental grid
  - Isolatable single-phase radial branches
  - Three-phase centrally generated power
Desired Features

Theory of Approach
Example Zone-Based Grid Collocation
Control/Operator’s View
Theory of Approach

• Configurable (selectable generation sources & loads at multiple levels)
• Adaptable
  • Swappable similar role components (i.e. meters/xfmrs)
  • Support addition of components/tech without excessive overhead
• Static physical footprint
  • Underground cables
  • Strategic bus locations
  • Strategic control capability (i.e. switch locations)
Example Zone-Based Grid Collocation

- Hybrid microgrid format
- Distributed generation within each zone
- Centralized Generation between zones
Control/Operator’s View

- Control distribution within zones
- Control of centralized distribution source(s)
- SCADA operator’s view