Playas Power Grid

Design Requirements and Desired Features

Background

Original Configuration

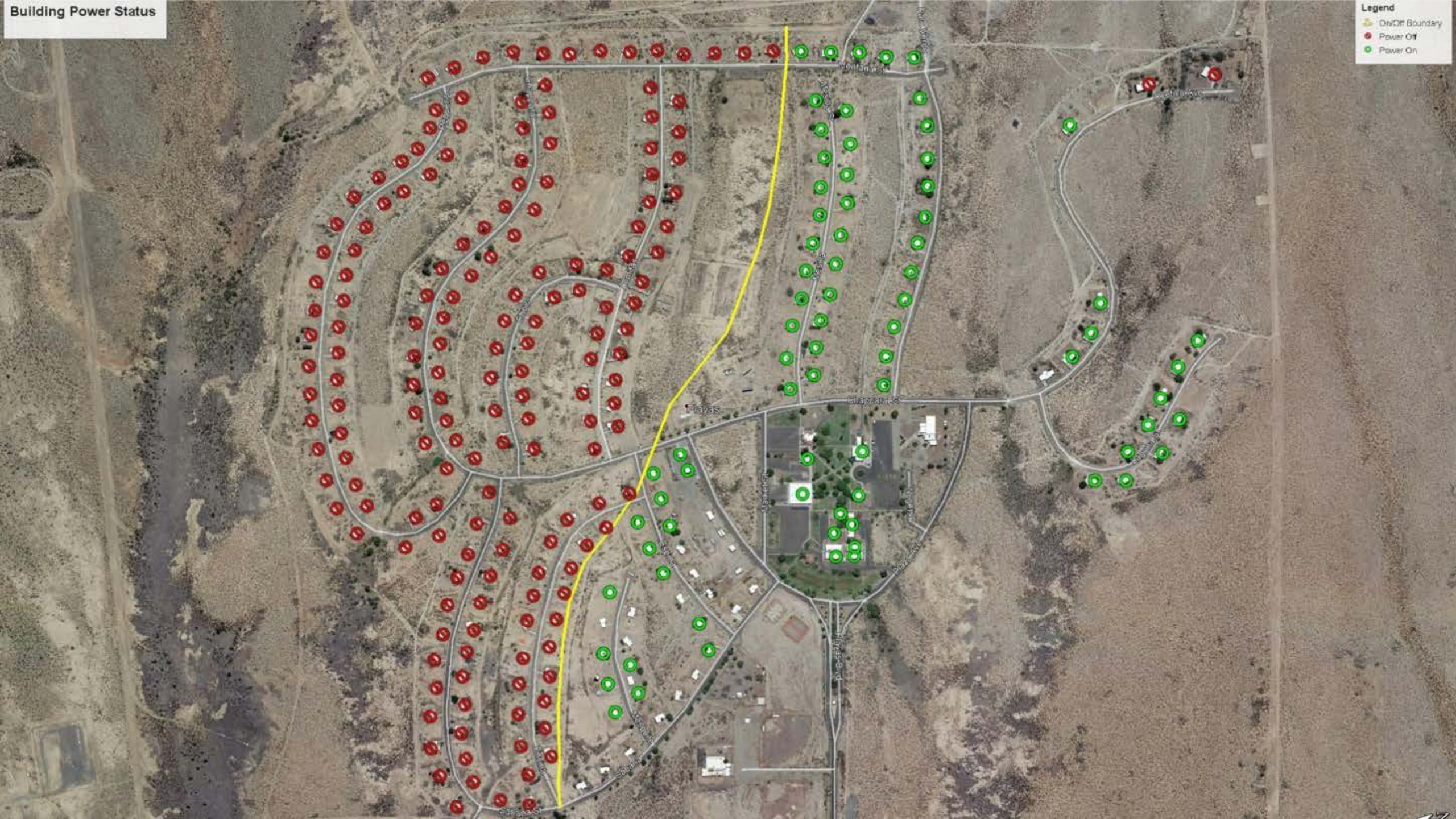
Current Configuration

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


Building Power Status
Legend
On/Off Boundary
Power Off
Power On

Design Requirements

Utility Grid

Critical Power Service

Experimental Grid

Utility Grid

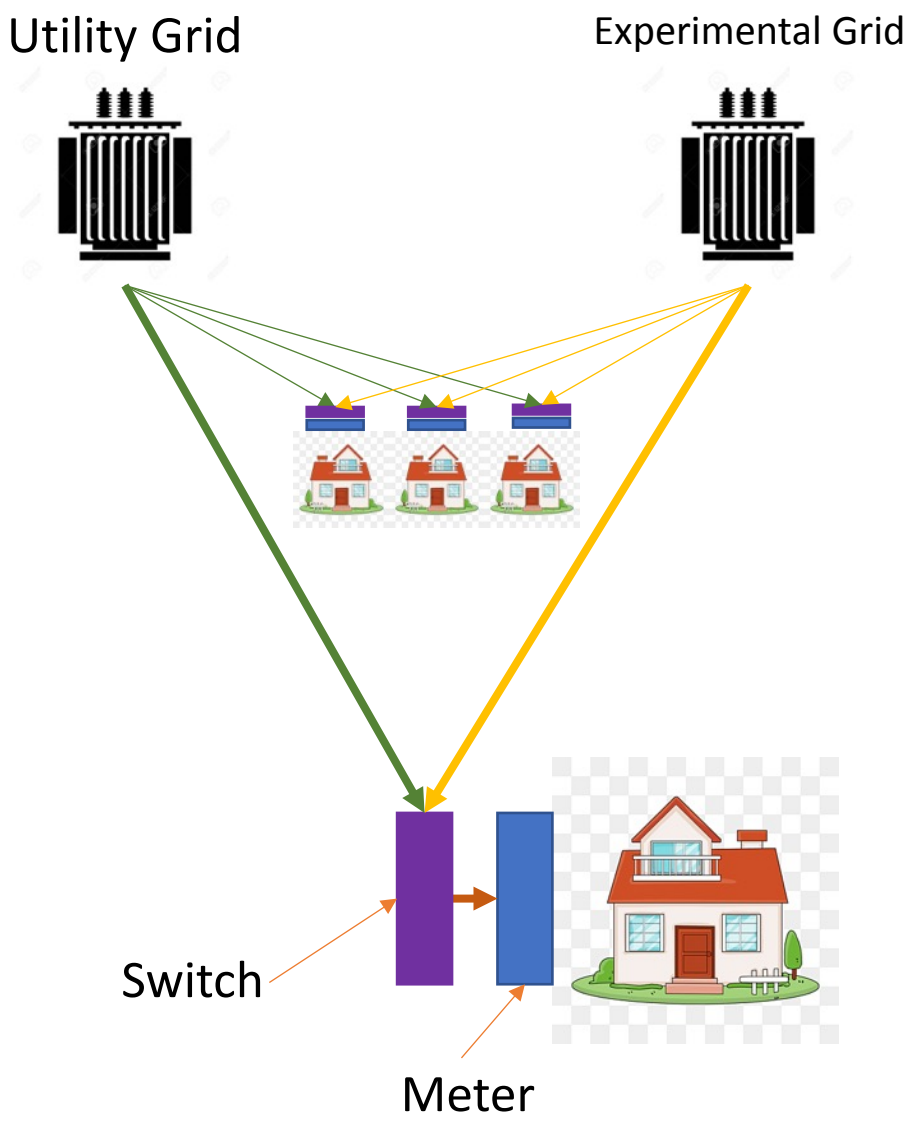
- Power as a utility service
- Ease of access throughout Playas
  - No dead zones
  - Standard headroom for future needs
- Robust distribution system
  - “Real-world” distribution on a small scale
  - Three-phase throughout Playas
  - Any single-phase as an accessible branch throughout

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

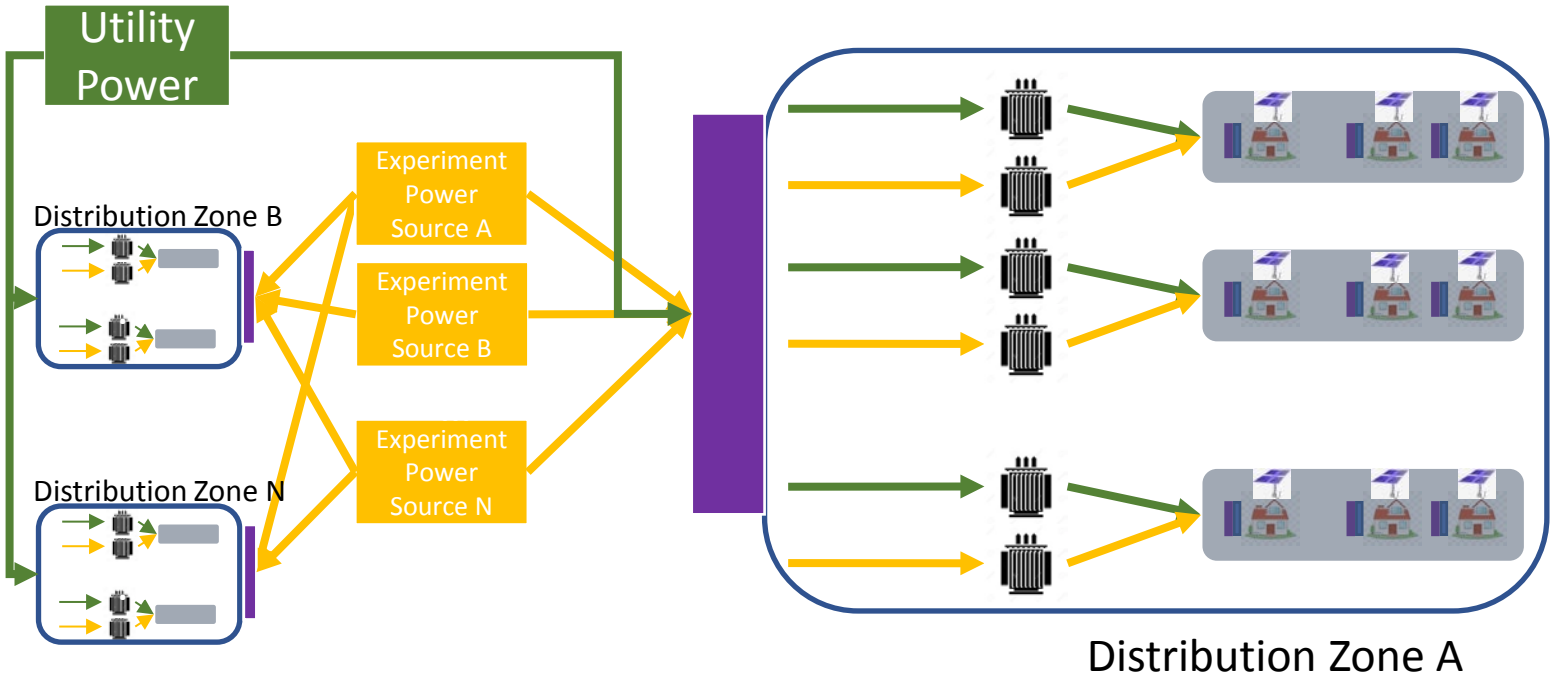
Control/Operator’s View

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