

How Big Data is Changing Our Distribution System



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Silver Spring Networks



Agenda

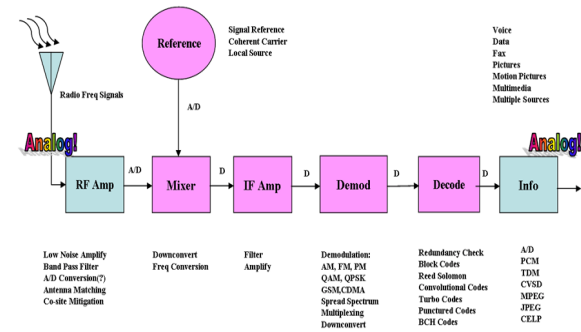
- Smart Grid Technology Enablers
- Telling a Story with Big Data
- Big Data for the Distribution System
 - Outage Management
 - Voltage Management
 - Distributed Generation/Solar
 - Asset Management
 - Communications Assessment
 - Next Generation – M2M - Streetlights

Smart Grid Technology Enablers



VLSI –
Low cost

Cryptography



Software Defined Radio



Solar Panels



Sensors - IED's



Internet Protocols

Database &
Storage



Technologies

Out Matched – Big Data from Smart Meters



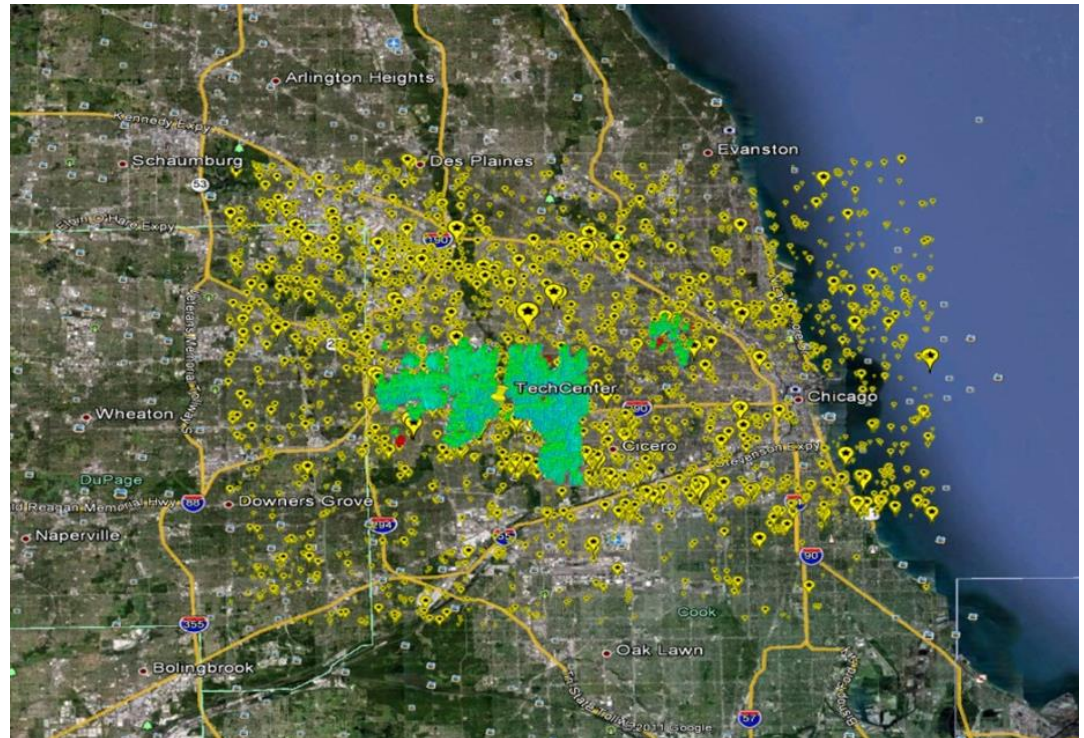
576,000,000 reading/day

(not including outage messages
+ events)



Lightning, Smart Meters, Outage

- **Yellow** = Lightning Strikes
 - (Vaisala Falls database)
- **Green** = Meters with Power
- **Red** = Meters without Power
- Identify permanent outages
- Monitor recloser performance



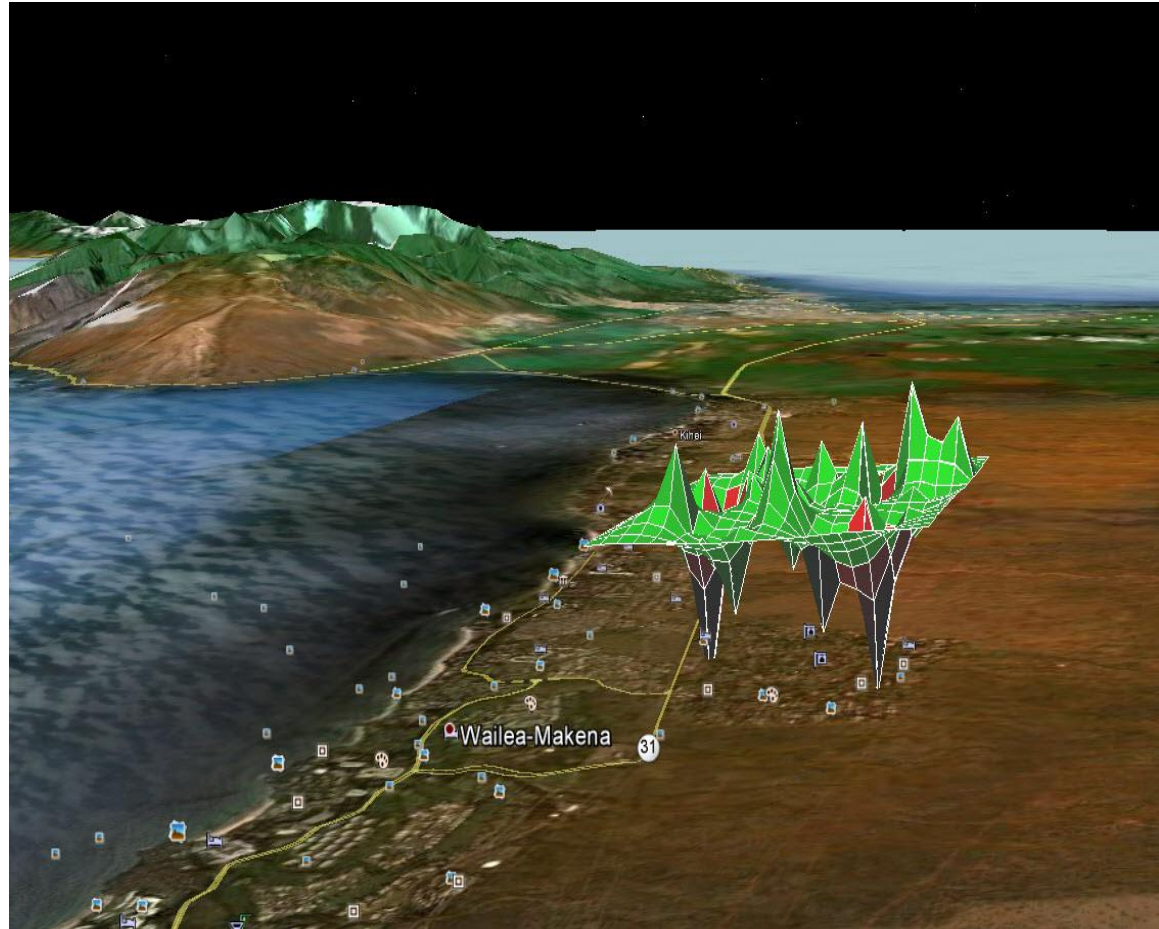
Feeder Voltage Assessment

- Multiple Feeders
- Voltage from Smart Meters
- 3D mesh of voltage
- 2D projection of feeder paths
- Visually see the $I^2 \cdot R$ drop
- Big data provides insight into voltage management



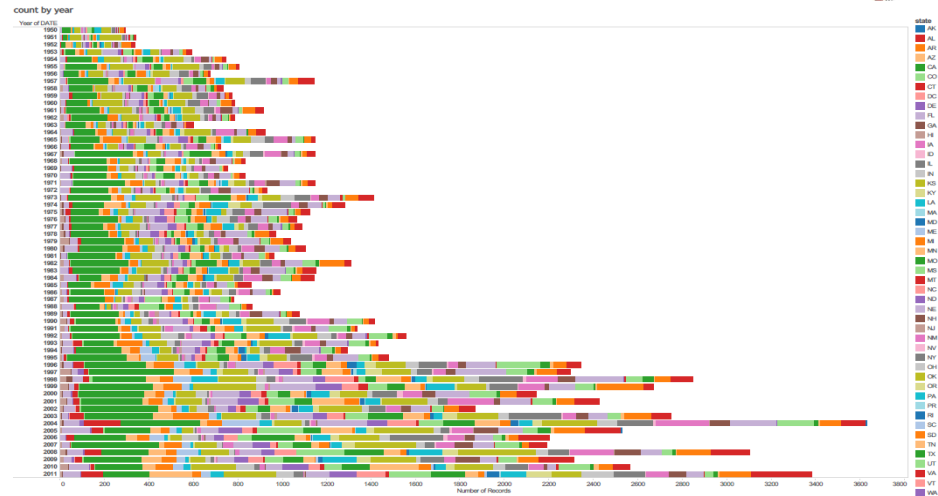
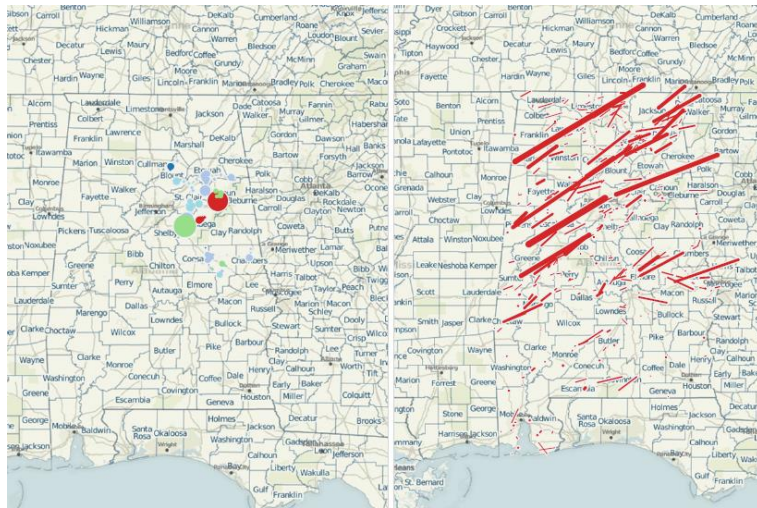
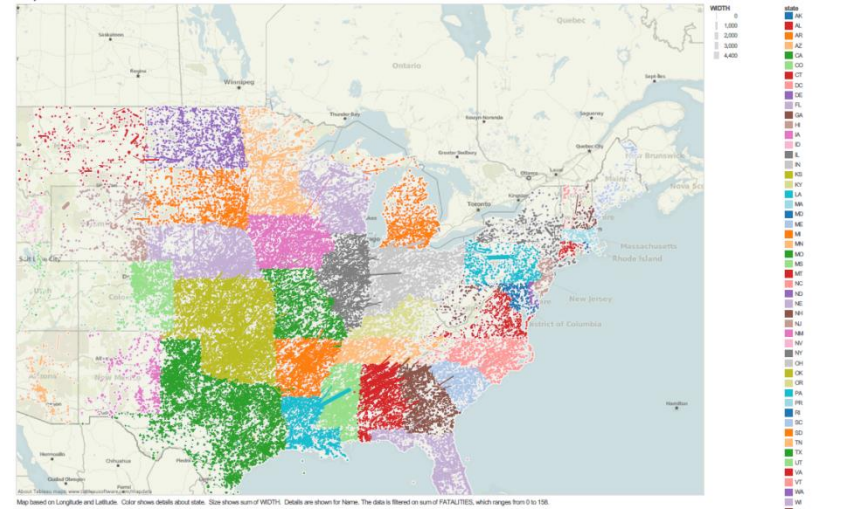
Solar Generation in Hawaii

- High penetration of solar
- Large panels – 15KW
- Low loads during the day
 - Vacation homes, sightseeing
- Lots of SUN!
- Feeders go Net negative around noon
- Causes voltage anomalies and unfavorable power factors/var flows



Tornado Paths & Utility Assets

- Download Tornado Paths
- 50 years – lat/longitude
- Load utility asset data
 - (meters, substations, xfmr)
- Identify “Near Misses”



How does an RF Mesh work? – High-rise story

Tenant meters

Robust connectivity in
building – elevator shaft

Span +/- 6 floors

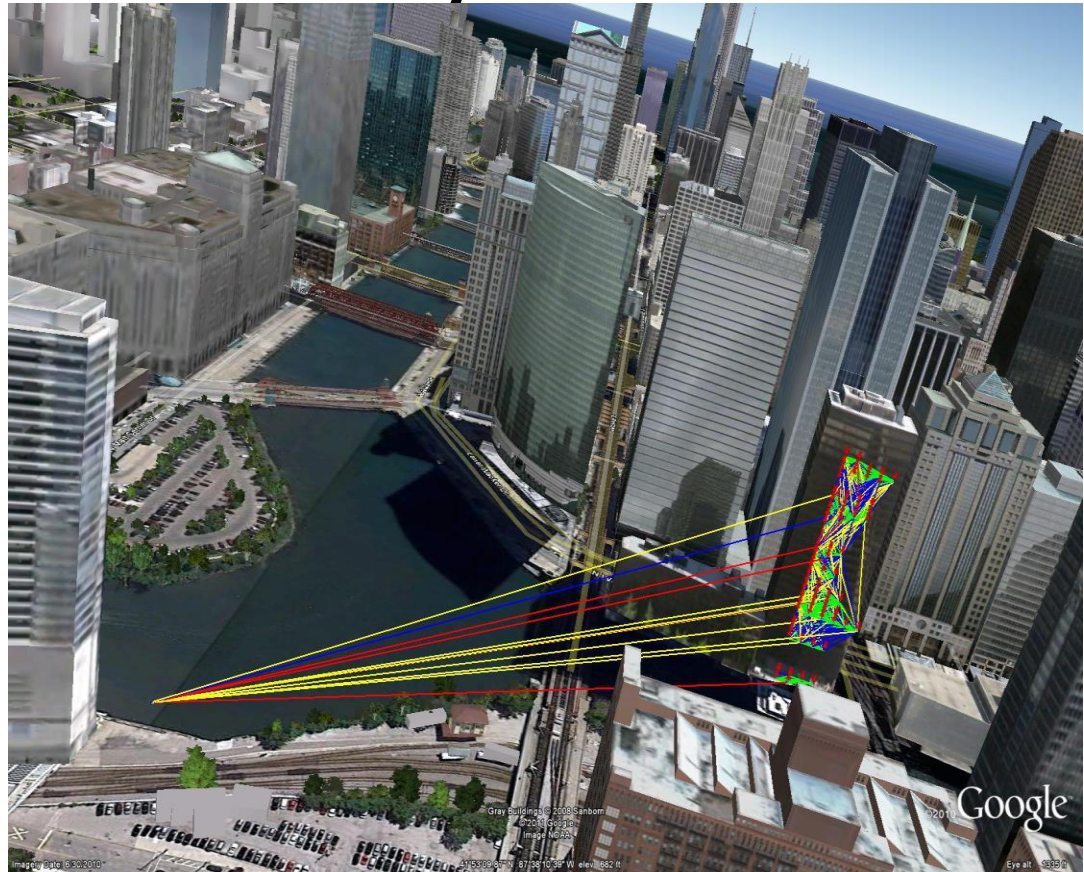
More difficult to get out
of the building

Isolated basement

Potential problem area

Line of sight good for RF
coverage

Mechanical floors



Color coded RF signal strength

New Smart Grid Application – Street Light Control

