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# Agenda

- \* **Introduction to GRI Diant**
  - \* **Our Core Technology**
  - \* **Our Products**
    - ◆ **Transmission**
    - ◆ **Distribution**
  - \* **Projects/Customers**
  - \* **Key Findings**
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# Overview

## \* Company Profile

- ◆ Founded in 2000 as Optimal Technologies; now GRIDiant® Corp.
- ◆ Project pilots including CEC, SCE, PEPCO, SMUD
- ◆ OEM partner with a major utility software/hardware vendor
- ◆ HQ San Francisco Bay Area; R&D in Raleigh; Sales in Atlanta

## \* Electric Utility Software Product Profile

- ◆ GRIDmaster™ T&D operational & planning optimization suite
- ◆ Powered by GRIDfast™ – patented & IBM SAFE certified
- ◆ Advanced Grid Management (AGM) near real-time software
- ◆ Adds value to – does not displace – existing tools, eg DMS, OMS
- ◆ Improves grid reliability, control, loss rate & asset deployment
- ◆ Leverages AMI data, vastly improving AMI ROI
- ◆ Saves utilities 4-8% annually in O&M and CapEx – up to \$40M/yr.

# Core Technology

- ✱ **GRIDfast: Electrical network optimization and analysis *engine***
  - ✱ **Works for both transmission and distribution systems**
  - ✱ **Operations tool: Can be plugged into DMS/EMS**
  - ✱ **Planning/analysis tool**
  - ✱ **Open Platform works with existing infrastructure**
  - ✱ **Scalable: can run inside sub-station devices as well as control center**
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# Power Flow Functionality

- \* Provides power flow functionality
  - \* 3-phase balanced and unbalanced power flow
  - \* Works on radial and networked systems
  - \* Handles reverse power flows
  - \* Can incorporate and analyze large number of DR and Distributed Generation units
  - \* Very fast: e.g. solves 100,000 node network in couple of hundred milliseconds
  - \* Solves transmission and distribution systems together or separately
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# Optimization

- \* **Non-linear optimization with ranking: Optimizes both active and reactive power together (AC model)**
  - \* **3 phase balanced and unbalanced models**
  - \* **Handles many types of optimization objectives and constraints, separately or together (multi-objective optimization)**
    - ◆ Loss minimization
    - ◆ Volt/VAr optimization
    - ◆ Switching optimization
    - ◆ Distributed Energy Resources optimization
    - ◆ Device loading optimization
  - \* **Very fast optimization and handles large systems**
    - ◆ 10,000 node distribution system can be optimized in a mid level desktop machine in less than 1 second.
    - ◆ 100,000 node combined transmission and distribution system optimized in 6-8 secs from cold start, in 1-2 secs from warm start.
  - \* **Solves transmission and distribution systems together or separately**
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# Comprehensive Ranking

- \* Resource Sensitivity Index (RSI)
  - \* Ranks each and every asset used as part of solution based on its sensitivity towards objectives
    - ◆ Priority list of controls, demand management, and DG based on their effectiveness
    - ◆ Identification of system *stresses* as related to reliability and efficiency
  - \* Fine granularity: Models and ranks effects of small resources accurately
  - \* Helps optimally place and size demand response, DG, AMI deployments, measurement devices and other resources
  - \* Distribution of control and priorities from centralized location to sub-stations and premises
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# Voltage Optimization

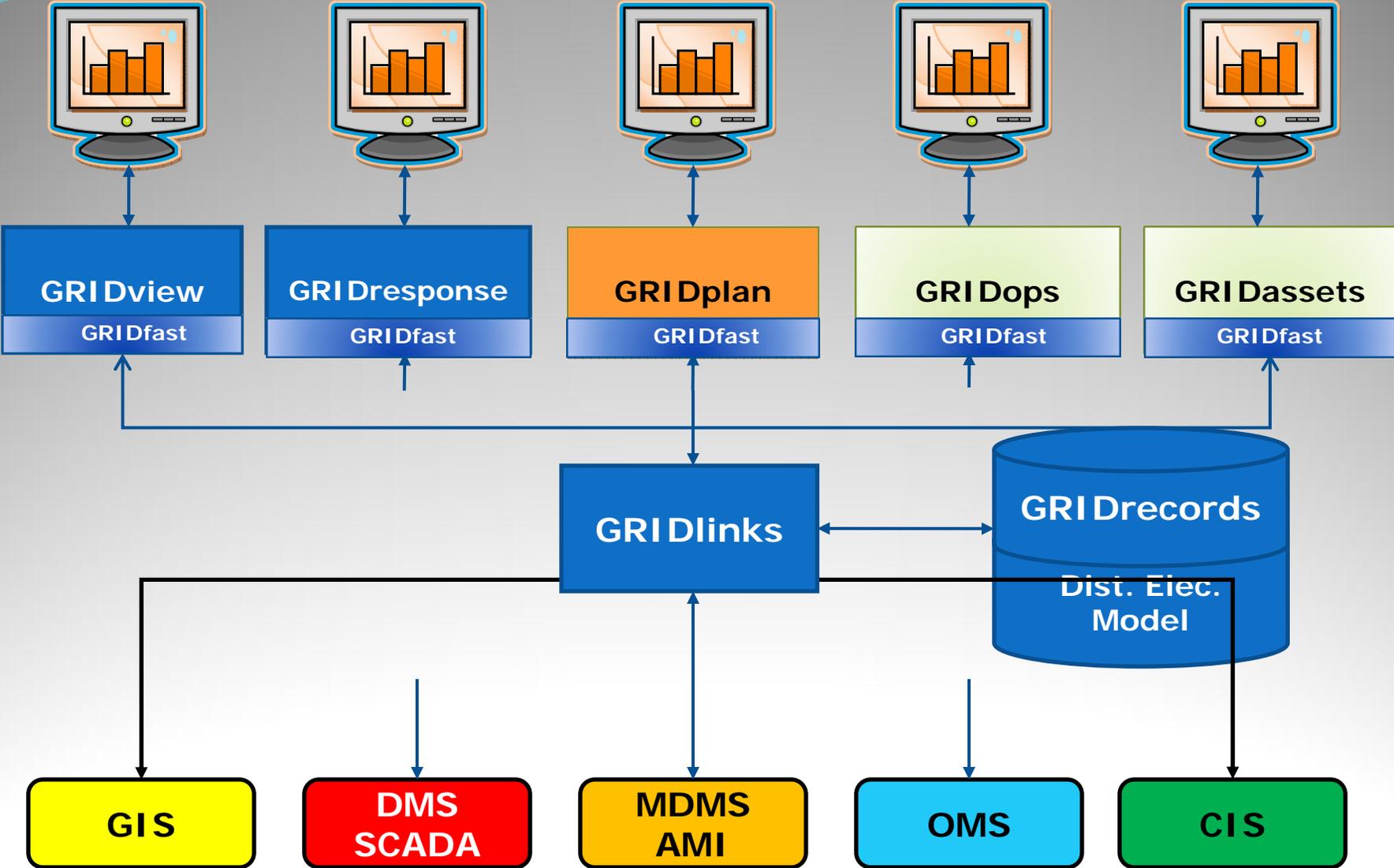
- \* **Handles voltages as limits**
  - \* **As objective**
    - ◆ Minimize bus voltage standard deviation
    - ◆ Improve voltage as part of minimum loss objective
  - \* **Controls used**
    - ◆ Reactive power controls (capacitors, TCULs and generator Q)
    - ◆ Selective active power rescheduling if required using RSI s
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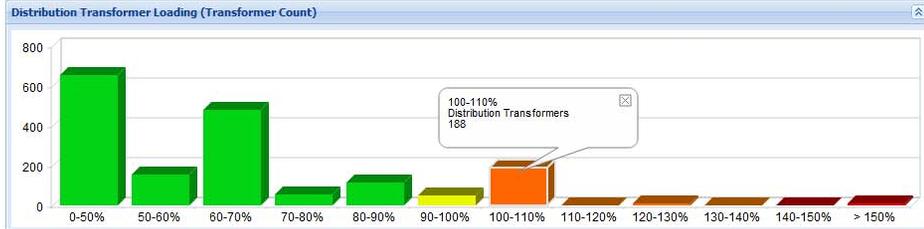
# GRI Dfast Transmission Product

- ✱ **Planning product**
  - ✱ **Desktop user interface**
  - ✱ **Functionality**
    - ◆ **Power flow**
    - ◆ **Optimization**
      - Minimum Loss
      - Minimum flow (complex power, current)
      - Voltage optimization
    - ◆ **Multi-objective optimization**
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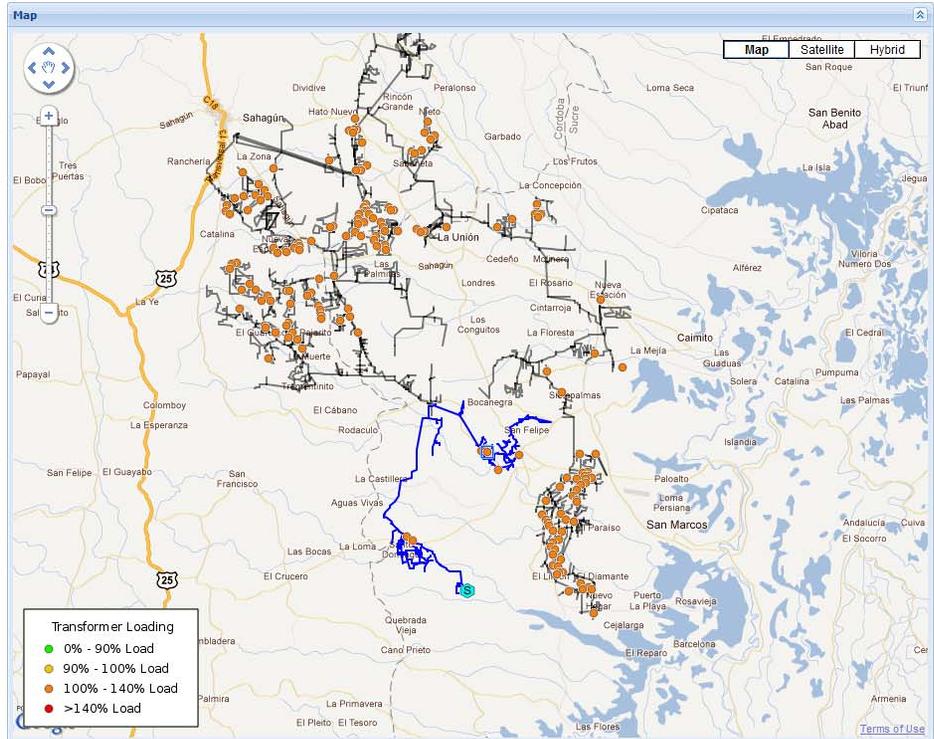
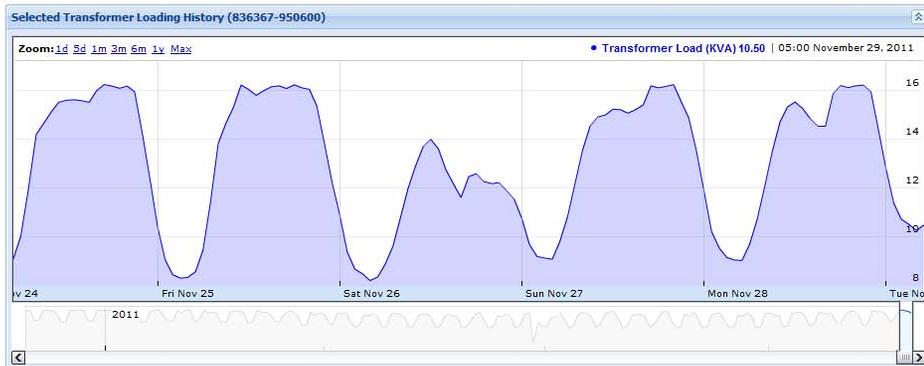
## Distribution Product: GRIDmaster





### Transformers / Customers

Transformer				Customer		
ID	Load (KVA)	NP Rating	Loading %	ID	Name	Address
850355-300940	10.95	10.00	109.47%	4241	Ray Bateman	4833 Happy Hollow Road
854357-910840	10.99	10.00	109.87%	4242	Tammy Chapman	4835 Happy Hollow Road
855358-244410	15.01	15.00	100.06%	4243	Sheila Jensen	4837 Happy Hollow Road
852353-790190	15.05	15.00	100.34%			
855371-045447	15.27	15.00	101.78%			
861357-270470	15.65	15.00	104.31%			
830361-560390	15.70	15.00	104.66%			



# Projects

- \* **California Energy Commission**
    - ◆ Bay area blackout prevention study
    - ◆ IDER optimization (SVP, SCE)
    - ◆ Combined T&D system
  - \* **Load Serving Capability Optimization**
    - ◆ California based municipal utility
    - ◆ Voltage, VAr optimization to improve load serving capability
  - \* **Distribution Reliability improvement using V/VAr optimization**
    - ◆ Distribution utility
    - ◆ Improve load restoration while maintaining healthy voltages
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# Key Findings

- \* In all our projects and deployments, voltage is at least considered as a constraint and is at least one of the main considerations
  - \* Voltage optimization (T&D) can have significant impact on
    - ◆ Losses
    - ◆ Load serving capability
    - ◆ Congestion
    - ◆ Power quality
    - ◆ Reliability
  - \* Optimization at the distribution level has impact on the sub-transmission/transmission level
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