

Extend Grid Operations' Visibility to the Low Voltage Network

Oracle Utilities Low Voltage Network Management Solution

New York City alone consumes 60% of the electricity generated in the entire state.¹ There's a vast underground distribution network that carries 86% of the load of the entire city serving 82% of the customers.² In addition, New York is re-inventing its distribution network with smart meters and distributed energy resources, significantly increasing low voltage footprint.

Similarly, Lisbon, Portugal has a vast low and medium voltage distribution mesh network. In addition, they are deploying distributed energy resources (electric vehicles/charging stations, solar, and storage) at an increasing rate.

Both of these cities serve as great examples of low voltage underground and mesh networks while also an expanding customer technology footprint.

The Grid Operator's Dilemma – Incomplete Visibility of the Low Voltage Networks

Grid operators have good visibility of the high and medium voltage primary networks (greater than 400 volts) in the grid. They can plan, model, and manage these networks with current technologies. But often, they lack visibility of the urban mesh and underground low voltage networks (120 - 400 Volts), since they are not modeled to take into account complex mesh network characteristics. Hence, they have to look for additional solutions; often they're manual, lacking end-to-end automation.

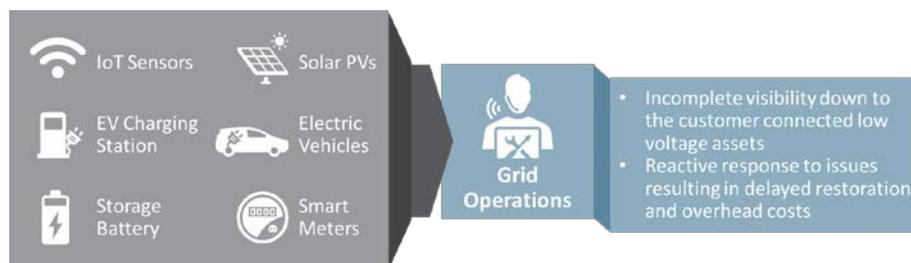


Figure 1: Emerging Low Voltage Inputs to the Grid Operations Model

Oracle Utilities Solution – The Grid Management Platform

¹ How New York City Gets Its Electricity (New York Times). <https://www.nytimes.com/interactive/2017/02/10/nyregion/how-new-york-city-gets-its-electricity-power-grid.html>

² A Stronger, More Resilient New York (NYC Special Initiative for Rebuilding and Resiliency). P108. http://www.nyc.gov/html/sirr/downloads/pdf/final_report/Ch_6_Utilities_FINAL_singles.pdf

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BENEFITS

- Gain instant visibility of the low voltage mesh and underground network without extensive modeling
- Simulate the low voltage network just like the primary network in one platform
- Graphically identify network problems faster
- Increase reliability scores and customer satisfaction
- Produce and share reports instantly across the organization

Typically, grid operators don't have low-voltage and secondary network modeled in their distribution management systems. It's common to find low voltage circuit and device data in the planning tools that are not automated. Operators and field workers follow manual procedures to find faults and fix them. Therefore, response to problems in the low voltage network is reactive, resulting in overhead expenses due to recurring crew visits to resolve faults and outages.

Oracle Utilities Low Voltage Network Management (LVNM) solution is built on the Oracle Utilities Network Management System (NMS), the grid management platform. This solution supports modeling, analysis, and ongoing management of the low voltage network. Utilities get a base platform that has the required adapters. The platform maintains a robust model that mines all the network dependencies, voltage limits, and current flows. LVNM functionality monitors power quality, creates a load forecast, and updates device status in real-time.

Advanced Features in the LVNM Application

These advanced features enhance low voltage network management instantly:

- » **Power Flow** – The grid operators can simulate the entire low voltage network including behavior of the protectors. Power Flow helps operators plan for network expansion but importantly identify voltage fluctuations, violations limits, fault current, and losses for system equipment. Grid operators use Power Flow in real-time or study mode to automatically resolve topology changes when devices are opened and closed.
- » **Feeder Load Management** – The grid operators can predict the load conditions on feeders and transformers and represent it graphically. The operators get end-to-end visibility by aggregating load profiles and device data from SCADA, AMI, and other systems. The aggregate data enable them to produce future load forecasts. By forecasting load ahead of time, utilities can avoid outages as well as prolong the life of assets, translating into reduced customer interruptions.
- » **Suggested Switching** – The grid operators can preplan their low voltage and secondary network switching plans. Suggested switching generates a plan that the operators can deploy during restoration. This feature eliminates paper switching forms and finger tracing of the electrical system, while significantly reducing switching errors.

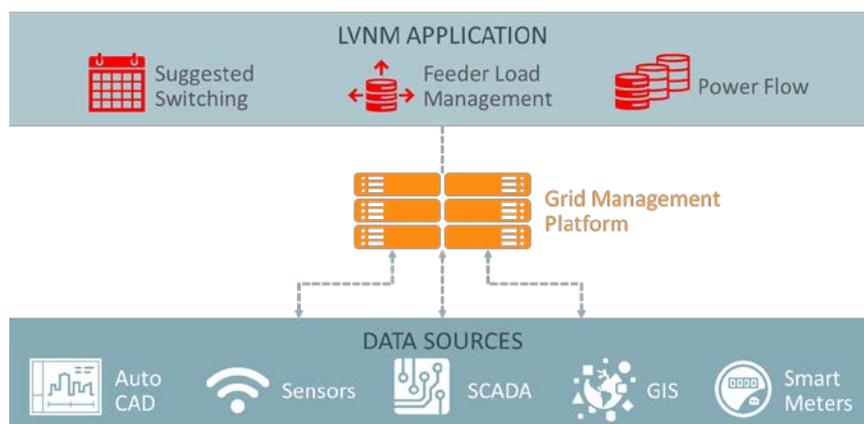


Figure 2: Grid Management Platform Provides Advanced Capabilities to Managing Low Voltage Network

RELATED PRODUCTS

- Oracle Utilities Network Management System
- Oracle Utilities Analytics

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