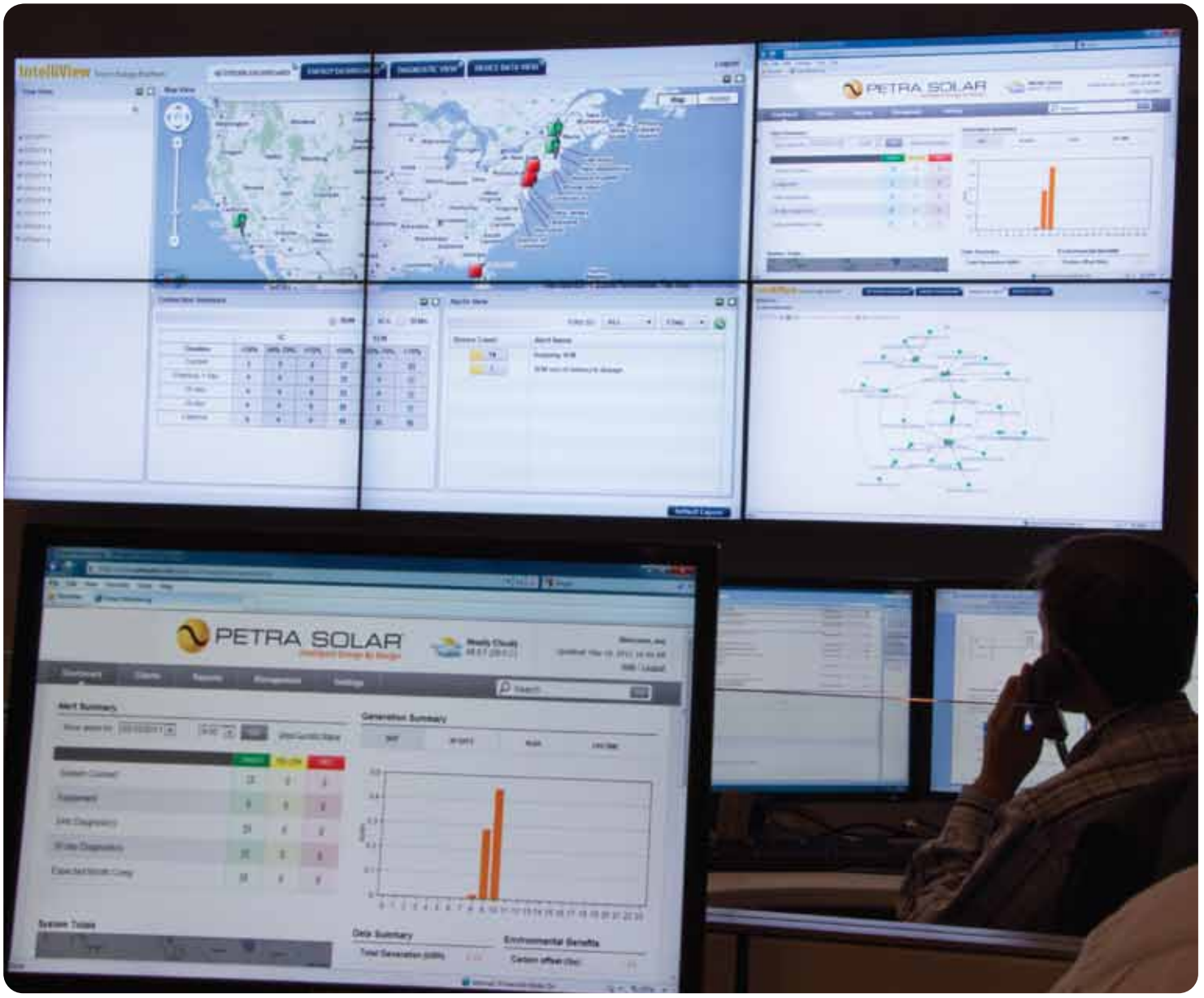
Petra Solar Smart Energy Services

Network Operations Center Services
and IntelliView™ Network and Energy Management Platform



Increase Efficiency and Reliability with Petra Solar's Network Operations Center and IntelliView Management Platform and Services

Overview

Petra Solar's smart energy services feature data analytics coupled with highly skilled management of critical energy systems. This premier offering is comprised of the Network Operations Center (NOC) services and IntelliView™ – Petra Solar's smart energy management platform. This powerful combination allows customers to collect useful data along with providing operations and support services to manage their smart grid, including renewable energy, energy efficiency and grid reliability systems.

Network Operations Center Services

The Network Operations Center provides critical support and operations for the smart grid network and smart energy systems, enabling optimal performance of the system and network. Petra Solar offers a comprehensive set of support and operation services for SunWave, GridWave and IllumiWave smart energy systems.

Customers can leverage the expertise of the Petra Solar highly trained technical staff, and best-practice tools and processes to ensure accurate management, monitoring, and timely performance. The services are available in packages to meet varying customer needs – from Support to full remote Operations.

When selecting Petra Solar as an operations partner, it allow utilities to focus on other mission critical functions, while deriving full benefits from their investment in the Petra Solar designed smart grid system.

Network Operations Center Key Features

- Highly trained technical staff
- Service levels:
  - Operations
  - Support
- Remote monitoring
- Troubleshooting
- Problem resolution
- Energy management services
- Grid reliability verification
- State-of-the-art facilities
- Secure monitoring and data hosting using industry-standard implementation
- Physical security to NOC location
- Secure access
- Monitored CCTV
- 24-hour data security
  - Remote data center
  - Secure VPN
  - SSL
  - Firewall
- Redundant data storage and back-up
- Back up power

Network Operations Services Matrix

Service	Support	Operations	Service	Support	Operations
IntelliView license	●	●	Remote monitoring		●
Hosting services	●	●	End-to-end testing		●
Data storage	●	●	Triaging		●
Secure VPN to data center	●	●	Troubleshooting		●
Technical support	●	●	O&M dispatch		●
Provisioning	●	●	Energy settlement		●
Configuration management	●	●	Reporting		●
Field deployment verification	●	●	RMA		●
			User access administration		●

IntelliView

The Petra Solar IntelliView platform combines smart grid network management with energy management services for the suite of Petra Solar smart energy solutions:

- ***SunWave*** smart solar energy solutions
- ***GridWave*** grid reliability and efficiency solutions
- ***IllumiWave*** smart streetlight energy management and efficiency solutions

The IntelliView smart energy platform provides critical analysis of smart grid application data to enable remote command and control of large distributed energy systems to individual end units.

IntelliView places data for all deployed remote assets on Petra Solar designed smart grid networks into the hands of the customer. Additionally, the processing of myriads of data points in a useful manner empowers the user to effectively operate systems, pinpoint issues, receive alerts and create reports.

With a two-way communications network to support all deployed systems, not only is the operational data (telemetry) important, but so is the communications network related data. With the ability to view the status and health of the network, it assures optimal connectivity of all systems.

IntelliView's modular design creates the platform for additional data-analytic modules, coupling critical network management with smart energy applications. The robust platform is scalable to future smart grid applications, including energy efficiency, energy conservation, grid reliability and smart microgrids.

IntelliView is comprised of several modules that work in unison to enable management of the smart grid and smart energy systems on a network.

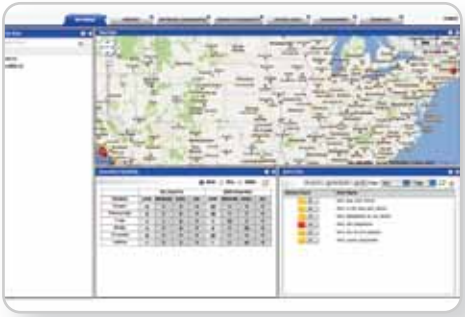
Network Management System (NMS)

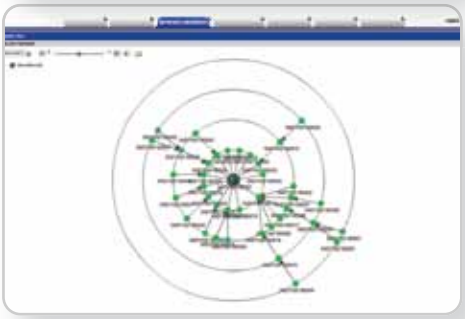
A key enabler of remote managment of all elements of the communications network

The Network Management System (NMS) is the foundation module of IntelliView. With NMS, users have a dashboard view of all elements of the communications network. Alerts, performance summaries, and mesh networking diagnostics are provided for problem identification and resolution on an exception basis.

The NMS module allows the user to configure the network, and ensure maximal system up-time. Therefore, when monitoring core assets (such as the SunWave system), the user has the ability to get the necessary data for reporting or troubleshooting in an efficient manner. Additional modules in IntelliView are added with respect to the devices deployed.

Each device with communications enabled, is displayed on an interactive map, and users can readily visualize network connectivity, status and issues.

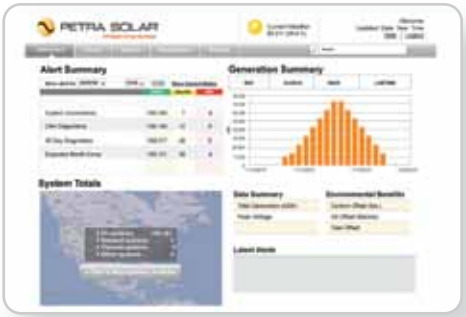




A dashboard view allows management-by-exception by displaying connection summaries, and trace the path of the mesh network via a Radial View.

IntelliView Services Key Features

- Manage network remotely to support
  - Renewable energy systems
  - Grid reliability
  - Energy efficiency
- Isolate or overlap network layer from added on applications
  - NMS
  - Plus: EMS, GMS*, LCS*
- Manage by exception – focus on issues only
- Reports on network and system health
- View historical data enabling:
  - Troubleshooting analysis
  - Trending
  - Forecasting
- Secure web hosting
- Secure updates and patches
- Continuous database Replication (RAID)
- Database backup (Including remote)
- Branding customizing
- Management dashboards and reports

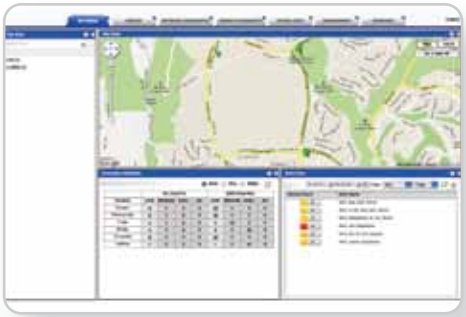


Energy Management System (EMS)*

A centralized view of a virtual power plant

Modules enable a centralized view of a virtual power plant consisting of a large installed base of SunWave smart solar systems distributed over a broad geographical area. The user can perform remote monitoring, command and control capabilities and energy generation reporting.

With distributed generation systems, when data is aggregated in an intelligent manner, it is most useful to the user and familiar, looking more like a power plant. Therefore, in like fashion to the NMS, the EMS provides management by exception features, where expected energy values can be compared to the actual values on an on-going basis. This provides the ability to quantify pre-determined periodic values of energy generation and quickly identify systems which may not be functioning as expected. The EMS features a dashboard view where energy generation can be correlated to geographic locations on a map view, and performance issues are identified and addressed in the alerts and performance summaries.



Grid Management System (GMS)*

A secure web-based platform for GridWave™ smart energy solutions

This IntelliView module enables GridWave system set-up and management as well as reporting of system status. Fully integrated with the EMS and NMS, IntelliView enables the essential remote operations capabilities of a complete solar virtual power plant solution.

Data analytics and command and control is made possible by management by exception, grouping, scheduling and setting up profiles for the systems deployed. Giving system operators the flexibility of grouping data in a logical manner similar to the grid architecture, takes the complexity out of dealing with myriads of data points, and efficiently support grid reliability.

Lighting Control System (LCS)

Remote energy efficiency and conversation management for IllumiWave™ streetlight controller

This module enables users to control when streetlights are turned on or off, in addition to dimmed, and seamlessly coordinate with traditional dusk-dawn sensors. Lights can be managed individually or grouped, commanded actions can be schedules on periodic, one time or event basis.

By having alerts generated for issues such as bulb outages, the burden on call-centers is reduced and customers are able to effectively schedule maintenance work based on priority and geographic locations, since all deployed systems and alerts are displayed on a map. Such data allows pro-active scheduling of preventative maintenance. By viewing the energy consumption, the user can report their energy costs, and quantify savings from their investment.

*Upcoming modules in IntelliView

Preliminary Product Brief

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