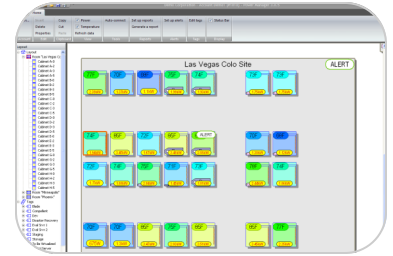




Packet Power[®]

Data Center Solutions



Packet Power for Data Centers

Packet Power provides the easiest, most cost-effective way to capture detailed power and temperature information for both single-site and large multi-facility operations.

Gain insight into what is driving growth in energy consumption by viewing usage based many criteria such as application, end customer, circuit, power phase, etc. Easily see hot spots and show power usage mapped across a facility in real time. Set alerts on power or environmental triggers.



Data Center Monitoring Made Easy

Most products can be installed without an electrician or the need to remove existing equipment. All devices utilize our self-configuring wireless network to communicate instantly with each other, keeping the need for IP addresses to just two per site. Use our software or integrate the power and temperature data into your existing operations management systems. And you can easily start small and grow over time.

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Our products are certified for use in North America, the European Union and many other countries around the world and are supported by a network of partners in 23 countries.

Benefits

- Deploy quickly and at a fraction of the cost of smart PDUs or branch circuit monitoring
- Extend the useful life of power-constrained data centers
- Quantify energy efficiency savings Correctly allocate energy costs
- Avoid power and temperature-related outages
- Use with Packet Power's EMX application or your existing monitoring system

Features

- Map facility heat and power usage in real time
- Monitor power at any combination of device and circuit level for thousands of devices in multiple facilities
- Measure temperature, pressure and relative humidity
- Use our applications or export data via SNMP or Modbus/TCPIP

The Packet Power Solution

- Seamlessly integrates monitoring hardware, wireless network, data analysis and reporting
- Wireless monitoring devices
 - **Smart Power Cables** incorporate precise power and temperature monitoring into a power cord format.
 - **Panel-Based Monitoring** provides main and branch circuit monitoring at the PDP.
 - **Environmental Monitors** track temperature at multiple points per cabinet, relative humidity, differential pressure and dry contact switch status.
- Uses a secure 900-Mhz wireless mesh network optimized for the challenging wireless conditions found in data centers
- Application software
 - **Power Manager** makes it easy to map the monitoring devices to your data center, show a real-time power and heat map, and manage alerts.
 - The **EMX** energy portal makes monitoring information easily accessible by providing access from any Web browser to extensive real time data and easily customized analytical reports.



Packet Power[®] Smart Power Cables

Product Specification

Packet Power **Smart Power Cables** provide an easy way to gather power consumption data from nearly any device with a plug.

Overview

Our Smart Power Cables feature the same power monitoring components found in many smart meters packaged in an easy-to-install format—a power cord. When plugged in, the cables automatically begin to capture detailed information on power usage. They detect other nearby smart power cables and automatically form a wireless network to allow easy sharing of information. Add or remove a smart power cable and the system automatically adapts.

Power usage information can be routed to local monitoring applications or sent to Packet Power's Energy Analysis System. This makes it possible to quickly deploy an advanced power monitoring infrastructure with minimal disruption and limited need for IT resources and expertise.



3-Phase and Single-Phase Models

Key features

- Precisely measures power and temperature from just a few or thousands of cables
- Captures detailed, time-stamped data on amps, volts, watts, watt-hours, volt-amps reactive, power factor, frequency, spikes and sags
- Supports single-, two- and three-phase power in 110 to 240 VAC, 50 to 60 Hz, and 10 to 100 amps.
- Incorporates advanced security features throughout the system
- Maintains key data during power and communications disruptions
- Fail-safe design will not disrupt the flow of power
- Packet Power software provides flexible, web-based reporting and alerts
- Interfaces to other monitoring applications in TXT, HTML, CSV, XML, SNMP or Modbus/TCPIP formats
- Certified for use in North America, the European Union and many other countries world wide.



Summary

- Easily capture and analyze power usage data
- Simple “plug and play” installation
- Models range from 10 amp to 63 amp capacity (panel-based monitoring available up to 2,000 amps).
- Self-configuring wireless mesh network gathers data from hundreds of power cables and Environmental Monitors
- System requires just one Ethernet port and IP address
- Full wireless encryption is available
- Complete energy analysis system installs easily
- Full alerting capability
- Offers real-time data and long-term trend analysis
- Can interface to other monitoring applications using SNMP or Modbus/TCPIP protocols

Wireless Data Network



Monitoring and Analysis Options



Standard Connector Types

NEMA	IEC	Other
15 to 30A Std or Locking	10 to 63A	10 to 60A
5-15, 6-15, 5-20, 6-20, 5-30, 6-30, 15-20, 15-30, 21-20, 21-30	60320 (C13/C14, C19/C20) 60309 Pin and Sleeve (2P+E, 3P+N+E)	Hubbell®, RussellStoll®, Europlug, country-specific types

Over 100 models are available. Power Cables are for indoor use only on properly protected circuits. Each Smart Power Cable will typically link to other cables or Environmental Monitors over distances of 10 to 30 meters. Each cable does not need to be in range of a Gateway, just in range of another cable.





Packet Power[®] Environmental Monitor



Product Specification

Introduction

The **Packet Power Environmental Monitor Version 2 (EM)** makes it easy and affordable to monitor temperature, relative humidity, differential pressure and dry contact switches.

Overview

The Packet Power EM is a powerful and versatile monitoring tool. Each unit can gather temperature readings from up to 10 temperature probe cables. These cables can be concentrated to provide multiple data points per rack or spread across as many as five racks to minimize monitoring costs. And the units can be further equipped to also measure humidity or differential pressure.

The Packet Power EM leverages the full capabilities of Packet Power's wireless data collection infrastructure. The Packet Power EM instantly begins sharing information across the wireless network with other EM devices and any Packet Power Smart Power Cables installed in the facility. Information from all monitoring points is then made available for use in local software applications or Packet Power's cloud-based energy analysis service.

Key features

- High precision measurement ($\pm 1^\circ \text{C}$, $\pm 2\% \text{RH}$, 3% pressure)
- Map temperature readings to facility layout diagrams
- Generate alerts if temperature becomes too high or too low
- Track hundreds of monitoring points per facility in single or multiple facilities
- Access information in real time via web portals and facility maps
- Detailed, easily customized reports

Configuration Options

The Packet Power EM can be used in the following configurations:

- Single Rack: temperature sensors at the top, middle and bottom of the front and top and bottom of the back
- 2-Rack: three temperature sensors in the front and two in the back of each of 2 adjacent racks
- 3-Rack: three temperature sensors in the front of each of 3 adjacent racks and one sensor in the back of the middle rack
- 5-Rack: two sensors in the front of each of 5 adjacent racks
- Humidity and differential pressure versions are available

Operating Environment

Indoor use only, powered by a 110–250V AC adapter or via Power over Ethernet (requires a PoE splitter).



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Summary

- Captures up to eleven temperature readings per monitoring unit in near real time
- Provides the option to add relative humidity or differential pressure measurement
- Leverages the Packet Power wireless network for easy deployment
- Scales to hundreds of monitoring points and multiple facilities
- Enables real-time facility heat maps

Overall Solution Components

- Smart Power Cables record detailed power usage in real time (A, V, W, VA, kWh and frequency)
- Fail-safe design ensures continuous power flow
- Wireless design for easy data gathering

Smart Power Cables



- Self-configuring wireless mesh network of monitoring devices
- Ethernet Gateways gather data from hundreds of power cables or EM devices
- System requires just one Ethernet port and IP address
- Energy usage data is transmitted to analysis application

Wireless Data Network



- Complete energy analysis system offers easy access to real-time data and historical reports.
- Packet Power's software can be accessed as a service or installed locally. Or provide data via SNMP or Modbus to 3rd-party monitoring applications.

Monitoring and Analysis





Packet Power[®] EMX Energy Portal

Monitor and Analyze Energy Usage

Packet Power EMX makes it easy to access detailed power and environmental information. Using any web browser, you can quickly see your top power draws, check which circuits are approaching capacity limits, check temperature and examine usage trends across time.

You can also allocate energy costs, create customized reports, design and publish graphical dashboards and rename monitoring units using your own naming conventions.



Closely integrated hardware and software

EMX provides a simple “plug and play” installation experience when used with our wireless power and environmental monitoring devices, making it easy to immediately begin gathering and analyzing data. You can customize the system to create a power and heat map of your facility with information on cabinets, rooms, custom categories, flexible reports, and full alert capabilities. You can install EMX locally or we can run it for you. See a quick web demo at <http://vimeo.com/37772302> or contact us to talk in detail.



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Instant and affordable insight into:

- Real-time power usage, temperature, relative humidity and differential pressure information
- Trends in usage across time
- Power costs and CO2 emissions

Features

- Seamlessly integrates monitoring hardware, wireless networking, analysis and reporting
- Supports thousands of monitoring points across multiple facilities
- Multi-company support makes it easy to provide separate access to information to different parts of your company or customer set
- Can be used as-is or customized through reports, dashboards, languages and alerts
- Dynamic charting feature makes it easy to drill down to any period of time
- Accessible from any web browser
- Can be installed at your site or used from our hosted service.

Complete Wireless Monitoring Solution

Environmental Monitors track temperature at up to five points per data center cabinet as well as relative humidity, differential pressure and dry contact status.



Ethernet Gateways gather data over the wireless network from hundreds of monitoring devices using a single IP address.



Wireless Power Monitors come in “smart power cord” and panel-based formats and can monitor RMS power at any combination of device, circuit or panel level ranging from 10 to 2,000 amps. Cables are available with many connector types including NEMA, IEC, Hubbell, RussellStoll, and country-specific plugs. Indoor use only.





Packet Power[®] Power Manager

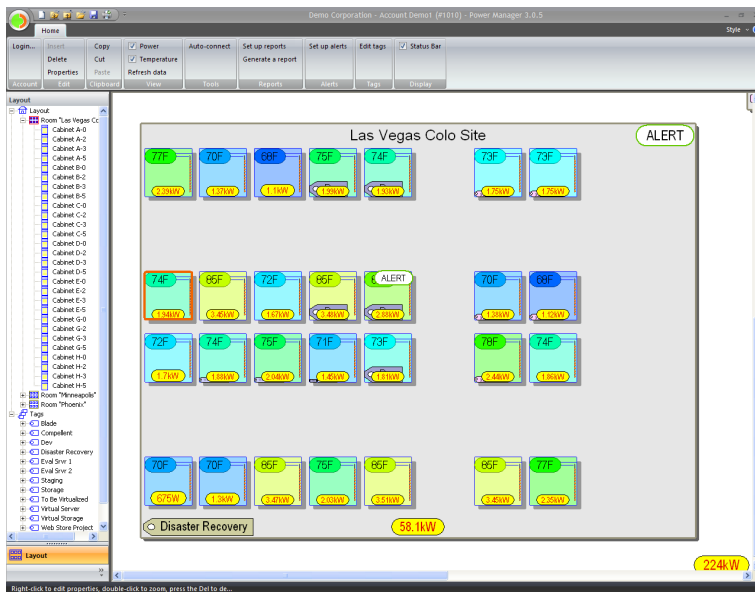


Introduction

Power Manager makes it easy for data center managers to use Packet Power's wireless power and environmental monitoring system to track and analyze detailed power and temperature information across time.

Overview

Power Manager is used to tailor your monitoring system to your data center(s). Using its graphical interface, you can quickly map where each power and environmental monitoring device is located. You can leverage the powerful tagging feature to make it easy to aggregate power usage across devices, circuits, cabinets or rooms. And Power Manager's policies features makes it easy to define and administer alerts on power or environmental criteria for a single device, a collection of cabinets or across an entire data center.



Key features

- Measures voltage, current, power, volt amps reactive, energy consumed, frequency, temperature, relative humidity and differential pressure
- Provides an intuitive, easy-to-use interface
- Displays real-time power and heat maps of a facility
- Delivers enterprise-level alert management
- Offers the full functionality of the Packet Power EMX web portal to access real-time and historical data
- Minimizes the need for IP addresses (only one per Gateway)



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Summary

- Easiest way to get accurate data center power and environmental information
- Leverages wireless monitors and cloud-based data analysis service for rapid installation and minimal ongoing support requirements
- Designed to allow you to use whatever combination of circuit- and device-level monitoring best suits your needs
- Supports thousands of monitoring points across multiple data center facilities

Monitoring Components

- Capture true power usage in real time at the device, cabinet and power distribution panel
- Measure multiple power parameters and temperature
- Many connector types
- 110 to 240V, 10 to 2,000A, 1- and 3-phase, fully certified
- Measure temperature at multiple points per cabinet
- Accurately track relative humidity
- Operate on AC or PoE (with a PoE splitter)
- Can be deployed at hundreds of points per data center

Smart Power Cables



Environmental Monitors



Wireless Data Network



- The Ethernet Gateway gathers data from hundreds of monitoring devices.
- Devices automatically form a self-configuring mesh
- Uses 900 Mhz frequency to meet unique challenges of data center environment
- Multiple security measures
- Meets FCC, EU and other government requirements



Packet Power[®] Modbus Connectivity



Introduction

Packet Power uses its Ethernet Gateway (EG) to link the Packet Power wireless power and environmental monitoring devices to IT monitoring applications that can accept data in the Modbus/TCPIP format. Modbus support is provided via two EG models:

- **Ethernet Gateway Modbus Solo** for use in locations with less than 250 monitoring devices and a single Ethernet Gateway.
- **Ethernet Gateway Modbus Enterprise** for use in locations with multiple Gateways and up to 2,000 monitoring devices.

As Packet Power's advanced wireless mesh monitoring network gathers data in real-time, the EG formats it into the Modbus protocol and transmits it to an installed IT monitoring application. The system provides a range of monitoring information:

- Power data including volts, amps, volt-amps, watts, watt hours and frequency.
- Environmental information including temperature at up to 5 positions per cabinet, relative humidity and differential pressure.
- The count, identification number and communication interval for all wireless monitoring devices reporting through each Gateway.



Each EG has a web console that displays the EG's status and allows the EG's settings to be tailored to fit the local network requirements.

Modbus Enterprise

The EG Modbus Solo model provides full Modbus support in sites with a smaller number of monitoring points and a single Ethernet Gateway. The Modbus Enterprise model adds the ability for each EG to aggregate information from other Modbus Enterprise EGs in that location. This greatly simplifies the interface between the Packet Power system and the Modbus monitoring application.

The Ethernet Gateway Modbus models come with several preconfigured Modbus register maps. Maps can be customized, and word and byte-swapping mapping schemes are supported. Support for up to 2,000 devices is made possible through the use of multiple slave IDs and register offsets.

The gateway Modbus node to slave ID and register offset mapping is automatically generated but can be customized if necessary.



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Summary

- Provides a Modbus/TCPIP interface from Packet Power's wireless power and environmental monitoring system
- Gathers power, temperature relative humidity and differential pressure data in real time and transmits it to an existing IT monitoring application.
- Requires very few IP addresses but can also assign virtual IP addresses to each monitoring unit to support older application designs.

Solution Components

- Record true power usage in real time using advanced energy monitors embedded in "smart power cables"
- Measures multiple power parameters and temperature
- Available in over 100 models
- True "plug and play" design

Smart Power Cables



- Measures temperature at up to 5 points per rack
- Each monitoring unit can cover from 1 to 5 racks
- Scales to hundreds of nodes per facility
- Can add tracking of relative humidity and differential pressure
- Operates on AC power or PoE

Environmental Monitors



- The small Ethernet Gateway device gathers data from hundreds of monitoring points via a wireless mesh radio network
- The system requires just one Ethernet port and IP address per Ethernet Gateway

Wireless Data Network





Packet Power[®] SNMP Connectivity



Introduction

Packet Power uses its Ethernet Gateway (EG) to link the Packet Power wireless power and environmental monitoring devices to IT monitoring applications that can accept data in the SNMP format. SNMP support (versions 1 and 2c) is provided via two EG models:

- **Ethernet Gateway SNMP Solo** for use in locations with less than 250 monitoring devices and a single Ethernet Gateway.
- **Ethernet Gateway SNMP Enterprise** for use in locations with multiple Gateways and up to 2,000 monitoring devices.

Packet Power's advanced wireless mesh monitoring network can gather data from thousands of Packet Power smart power cables and Environmental Monitors.

Data is captured in real-time, formatted into the SNMP protocol on the EG and transmitted to an installed IT monitoring application. The system can assign Virtual IP addresses to each monitoring unit, and provides a range of monitoring information:

- Power data including volts, amps, volt-amps, watts, watt hours and frequency.
- Environmental information including temperature at up to 5 positions per cabinet (when used with the Environmental Monitor), relative humidity and air pressure.
- The count, identification number and communication interval for all wireless monitoring devices reporting through the Gateway.



SNMP Enterprise

The EG SNMP Solo model provides full SNMP support in sites with a smaller number of monitoring points and a single Ethernet Gateway. The SNMP Enterprise model adds the ability for each Gateway to aggregate SNMP information from other SNMP Enterprise EGs in that location. This greatly simplifies the interface between the Packet Power system and the SNMP monitoring application.

Any monitoring application that supports SNMP should be able to use information from the Packet Power system. This includes working integrations to software offerings from APC ISX Central, Geist Environet, OpenNMS, GreenField Software, Power Assure and Raritan PowerIQ. Packet Power's SNMP MIB is available upon request.

Summary

- Provides an SNMP interface from Packet Power's wireless power and environmental monitoring system
- Gathers power, temperature relative humidity and differential pressure data in real time and transmits it to an existing IT monitoring application.
- Requires very few IP addresses but can also assign virtual IP addresses to each monitoring unit to support older application designs.

Solution Components

- Record true power usage in real time using advanced energy monitors embedded in "smart power cables"
- Measures multiple power parameters and temperature
- Available in over 100 models
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Smart Power Cables



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