

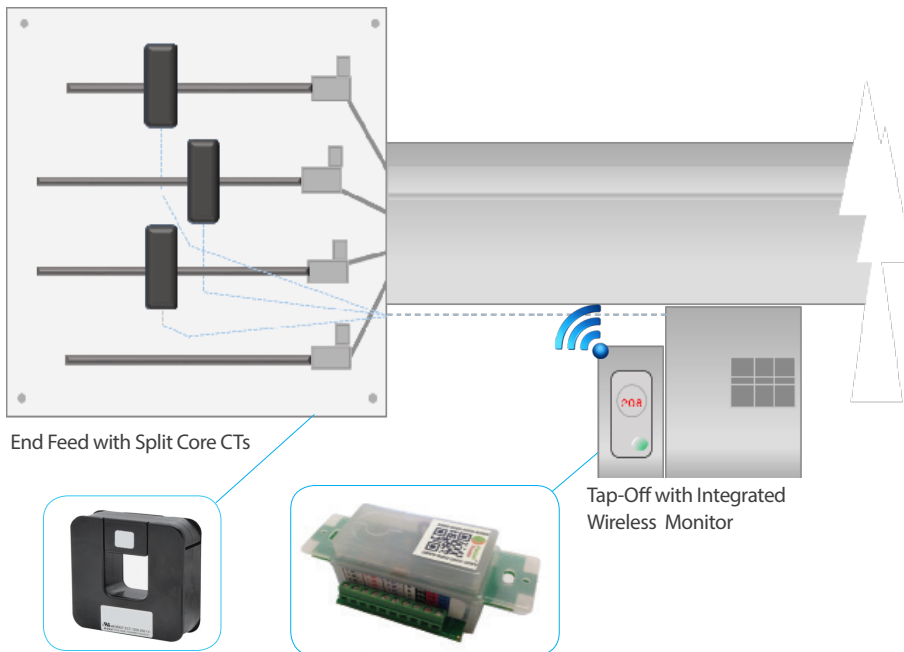
PACKETPOWER

APPLICATION NOTE

NON-DISRUPTIVE END FEED MONITORING RETROFIT

The Packet Power monitoring solution lets you easily and safely add wireless energy monitoring to your existing busway end feeds and tap-offs without interruption to your critical loads, at a price that is competitive with factory installed monitoring.

INSTALLATION OVERVIEW



THREE EASY STEPS

- 1 **Plug in tap-off box with wireless monitor:** A standard tap-off box with a pre-installed with a Packet Power three phase wireless power monitor allows safe access to voltage connections without any risk of interruption to the critical load.
- 2 **Split current transformers are placed around the end feed cabling** avoiding any removal of wiring or interruption of the load. No wire removal is needed.
- 3 **Start monitoring:** As soon as the system is installed, the network self configures and can instantly be viewed

The unique contact free installation process doesn't disrupt wiring. Split core CTs open up to go around incoming power cables in the end feed enclosure. Voltage sensing is done by plugging in a standard tap-off box that also houses a pre-installed wireless monitor.

FEATURES

- ▶ No interruption to the critical load
- ▶ Secure, wireless transmission of data on amps, volts, power and energy
- ▶ Local display of V and A readings by phase
- ▶ Supports 40A to 600A busway systems running at 120/208V to 240/415V
- ▶ Interfaces with most BMS and DCIM systems
- ▶ Monitoring network self configures - no technical expertise required
- ▶ Network works with tap-off modules
- ▶ Certified for use in over 50 countries
- ▶ Installed quickly by an electrician without any specialized training or tools

For more information, contact your local Packet Power partner or go to www.packetpower.com.

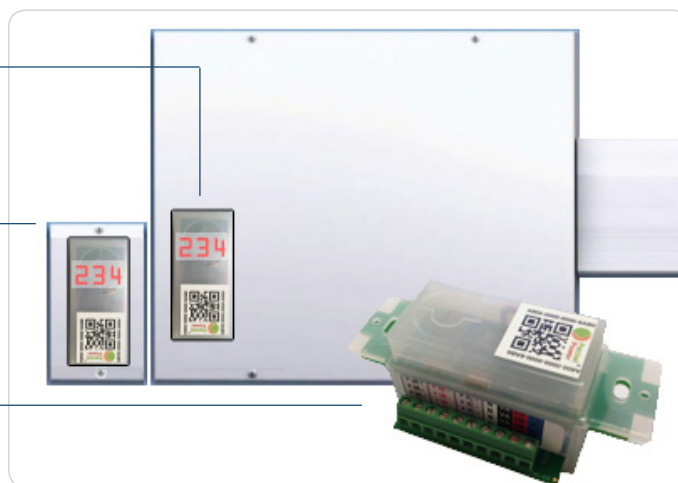


END FEED SOLUTIONS

Integrated inside the end feed: Power monitor is installed inside of the end feed box. [ideal for new builds]

External installation: Power monitor is installed adjacent to the end feed box using a standard (4.5" x 2.75") single gang box; available as a complete kit for rapid installation. [retrofit solution]

Multi-phase monitor: Installs in tap-off or end feed modules using split core and solid core CTs and includes a local LED display and wireless node. The small size (4.2" x 1.6" x 1.8") permits installation into any system including feeder breakers. Ideal for any multi-phase / multi-pole circuit.



TAP-OFF SOLUTIONS

Smart Power Cable - Hardwired



Smart Power Cable - Plug and Receptacle



Integrated Monitor



Smart Power Cables integrate the monitor directly into the power cable which can be hard wired into the tap-off or provided as a receptacle and plug cable set; three phase and single versions are available for almost any plug/receptacle type.

Integrated monitor places the monitoring node inside of tap-off module with the display visible

MONITORING SOLUTIONS

The EMX portal seamlessly integrates monitoring hardware, wireless networking, analysis and reporting tools into a ready to run system. Using any web browser, you can quickly see your top level or detailed power and environmental data, available power infrastructure, examine usage trends across time and more.



PacketPower Mission control Home Manage Analyze Downloads Help

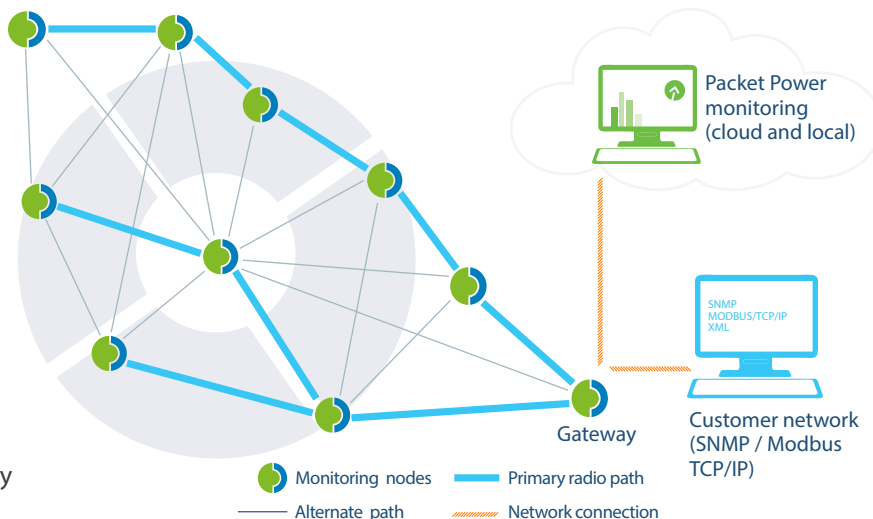
ENERGY USE BY DEPARTMENT

2014 April 1:00 - 2014 May 1:00	2014 May 1:00 - 2014 May 1:00	2014 May 1:00 - 2014 May 1:00	2014 May 1:00 - 2014 June 1:00
90000000000000000000	Energy 521618.43 kWh	Energy 790.20 kWh	Energy 522409.24 kWh
20000000000000000000	Energy 521608.02 kWh	Energy 790.26 kWh	Energy 522408.92 kWh
47000000000000000000	Energy 521610.93 kWh	Energy 790.61 kWh	Energy 522402.08 kWh
80000000000000000000	Energy 521615.13 kWh	Energy 790.94 kWh	Energy 522406.86 kWh
81000000000000000000	Energy 521606.61 kWh	Energy 790.59 kWh	Energy 522397.72 kWh
90000000000000000000	Energy 521612.14 kWh	Energy 790.55 kWh	Energy 522403.27 kWh
90000000000000000000	Energy 521608.85 kWh	Energy 790.34 kWh	Energy 522399.54 kWh
90000000000000000000	Energy 521618.42 kWh	Energy 790.49 kWh	Energy 522409.51 kWh
90000000000000000000	Energy 521611.95 kWh	Energy 790.33 kWh	Energy 522402.85 kWh
90000000000000000000	Energy 521614.56 kWh	Energy 790.70 kWh	Energy 522405.87 kWh
90000000000000000000	Energy 521619.32 kWh	Energy 790.58 kWh	Energy 522410.51 kWh
90000000000000000000	Energy 521620.06 kWh	Energy 790.51 kWh	Energy 522411.17 kWh
90000000000000000000	Energy 521639.44 kWh	Energy 800.20 kWh	Energy 523065.74 kWh
90000000000000000000	Energy 521616.48 kWh	Energy 790.48 kWh	Energy 522407.58 kWh
90000000000000000000	Energy 521607.38 kWh	Energy 790.37 kWh	Energy 522398.63 kWh

Packet Power Network Architecture Advantages

The convenience of wireless with the reliability of a wired network

Packet Power's self configuring mesh network delivers all the advantages of wireless connectivity while eliminating the traditional difficulties associated with wireless propagation and system configuration. If a direct connection is not optimal, the system routes the data through other monitors, optimizing each path with every transmission. Unique to Packet Power and designed for data centers, the resulting mesh network is more resilient and secure than point to point systems like WiFi. Adding new nodes and gateways is easy with the network seamlessly automating the new configuration, eliminating costly network administration resources. Invisible to WiFi devices, and using a 900 MHz band in most regions decreases the odds of conflict with other wireless traffic, improves security and increases wireless signal integrity in data center environments.



The heart of your power and environmental monitoring

Ethernet Gateway: At the center of the network is the EG3 Wireless Gateway module. One module can support up to 300 monitors with a single IP address and automatically manages the configuration of new modules. The Gateway also communicates with all Packet Power environmental and power monitoring devices for an end to end critical facility monitoring solution.



- ▶ Power
- ▶ Temperature
- ▶ Humidity
- ▶ Differential Pressure
- ▶ Dry Contact

Why customers choose Packet Power wireless solutions

999.999

RELIABILITY

Packet Power devices have been used in the most challenging critical environments around the world. Customer's recognize Packet Power as "the wireless solution that really works".



SCALABILITY

The ideal architecture for high device count environments, the system can accommodate a virtually unlimited number of wireless nodes. Adding a node is easy, with the wireless network automatically recognizing and configuring new devices.



SECURE

Packet Power devices use a proprietary node to node wireless communications protocol that is invisible to WiFi, Zigbee and other standard networks. In addition, the option to encrypt wireless traffic and fully segregate the monitoring network provides comprehensive security.



DATA AGGREGATION

All data from monitors is aggregated at the Gateway and immediately visible with no configuration needed. Open protocols (SNMP, Modbus TCP/IP, XML) allow the data to be acquired by just about any system. The available cloud or local monitoring application is ideal for managing the data for those looking for a plug and play monitoring solution.



REDUCED INFRASTRUCTURE COSTS

Choosing Packet Power means much lower installation and deployment costs, no device commissioning issues, and the freedom to deploy devices exactly where they are needed. Hardware costs are often far lower than hardwired networks and traditional wireless systems.

COMMUNICATIONS

Operating frequency	860-927 MHz + 2.4 GHz on certain models; specific frequency varies by region
Wireless protocol	Proprietary frequency hopping, self-configuring, load-balancing mesh network
Wired network protocol	TCP/IP (one IP address needed per Gateway), support for Modbus TCP/IP and SNMP protocols
Firmware updates	Wireless
Typical transmission range	10 to 30 meters indoors from any one device to any other
Antenna	Fully enclosed, fixed configuration
Cable to Gateway ratio	Up to 150 cables per gateway (unlimited Gateways per system)
Multi-site support	Yes
Encryption	Optional 128-bit

ENVIRONMENTAL

Operating temperature	-7° to +70°C (+20° to +113°F)
Operating humidity	5% to 95% non-condensing
Water and dust resistance	Indoor applications
Maximum operating altitude	2,000 meters (6,561 feet)
Power usage	Power Monitor: < 0.7W Ethernet Gateway: 0.7W

OUTPUTS

LED status indicators	Red / Orange Power / Status (Red/Orange); Communication (Green)
Local display	3 Digit LED (cycles Amps, Volts, Watts by phase) ¹
Monitored points	Voltage (V), Current (A), Power (W), Energy (Wh), Apparent Power (VA), Power Factor (PF), Frequency (Hz), all measurements +/- 1%, Temperature (+/-2°C)

CERTIFICATIONS (ELECTRICAL SAFETY AND RADIO EMISSIONS)

UL / ANSI 61010-1, CAN/CSA-C22.2 No. 61010-1, FCC Class B, CE (IEC/EN 61010-1:2001, ETSI EN 300 220-2, ETSI EN 301 489-3, IEC/EN 61326-1), ICASA, and certain country-specific requirements in Australia/New Zealand and the UAE.

MODELS

Device	Voltage (V)	Amperage (A)	Connector
End Feed	120 / 208, 240 / 415	100, 200, 400, 800, 1200, 2000 A	Internal installation or external enclosure; split core or solid core CT
Tap-Off (Integrated Monitor)	120 / 208, 240 / 415	35, 50, 75, 100, 120, 200 A	Internal installation (hard-wired); split core or solid core CT
Tap-Off (Smart Power Cable)	120 / 208, 240 / 415	10, 15, 16, 20, 30, 32, 50, 60, 63, 100	Reference cable chart below; available as plug-in or hard wired cable

SMART CABLE CONNECTOR TYPES (TAP-OFF)**NEMA**

Single Phase NEMA: 5-15 / L5-15, 5-20 / L5-20, L5-30, 6-15 / L6-15, 6-20, L6-20/L6-30
 Three Phase NEMA (3 wire + N + G): L21-20, L21-30
 Three Phase NEMA (3 wire + G): L15-20, L15-30

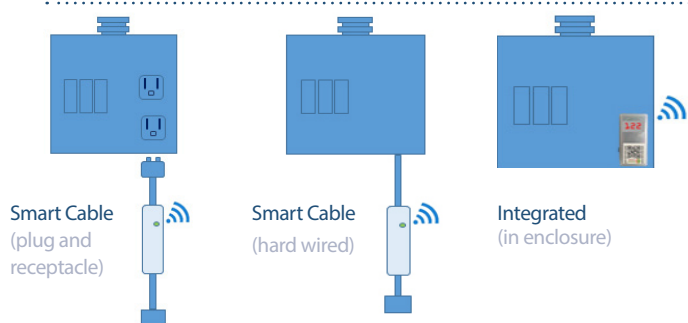
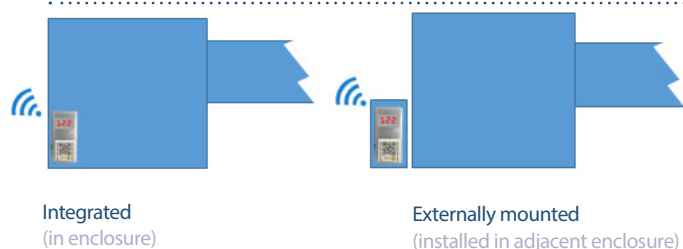
IEC

Single Phase IEC: 60320 C13 / C14, 60320 C19 / C20, 60309 2P+E 6h
 Three Phase IEC: (3 wire + N + G): 60309 3P+N+E 6h

OTHER

Single Phase: Schuko CEE7-7, AS/NZA 3112 2000, BS 1363A (UK), BS 546A (India, S. Africa), Whip, others on request
 CS6361/6360, CS8264/8265, CS8364/8365, 360_6W, 3720/3913, 3750/3933, 3720U-1/ 3913U-1, 3720U-2/3913U-2, 9_23U2, 9_23U0, 9_33U0, 9_53U2, 9_63U2

Three Phase (3 wire + N + G): 516_6W, 532_6W, 530_6W, 560_6W, 563_6W
 Three Phase (3 wire + G): 420_9W, 430_9W, 460_9W, 9_54U2, IBM D/3760

INSTALLATION OPTIONS**TAP-OFF****END FEED**

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