

Integrated Wire-Free Solution for Monitoring Power and Environment with RF Code and Sentry Power Manager (SPM) – (Part Number SPM-RFC)

Purpose

This technical note describes the components and process of the new power and environmental reporting solution between RF Code and Server Technology.

The joint solution integrates Server Technology's intelligent Cabinet Distribution Units (CDUs) and the Sentry Power Manager (SPM) enterprise management software product with RF Code's wire-free system of sensor devices and software for real-time, wire-free power and environmental reporting.

Overview of the Solution

The technology of RF Code and Server Technology systems working together creates the ideal solution for intelligent monitoring. The integrated solution has the capability of transmitting critical environmental data over a flexible, cost-effective, and wire-free infrastructure that overall can provide better management and control of power and operational costs.

The solution includes the following RF Code devices:

- Small, battery-powered, wire-free sensor tags
- Networked readers that receive sensor data
- Software that collects and organizes information (Zone Manager/Sensor Manager)

How It Works

The solution is activated by a software license key from Server Technology. RF Code wire-free devices (including sensor tags) are deployed throughout the data center. Through RF Code's open API, SPM connects to the RF Code Zone Manager to track sensor environmental data collected from the deployed sensor tags.

Device data is made available through the SPM user interface where sensor readings are displayed along with information collected from the CDUs.

Environmental data is reported, such as open/closed door status to enhance security in the data center; other operational details that affect cost and equipment uptime are also reported. The solution offers an opportunity to optimize data centers and distributed environments with insight into operational inefficiencies and facility improvements.

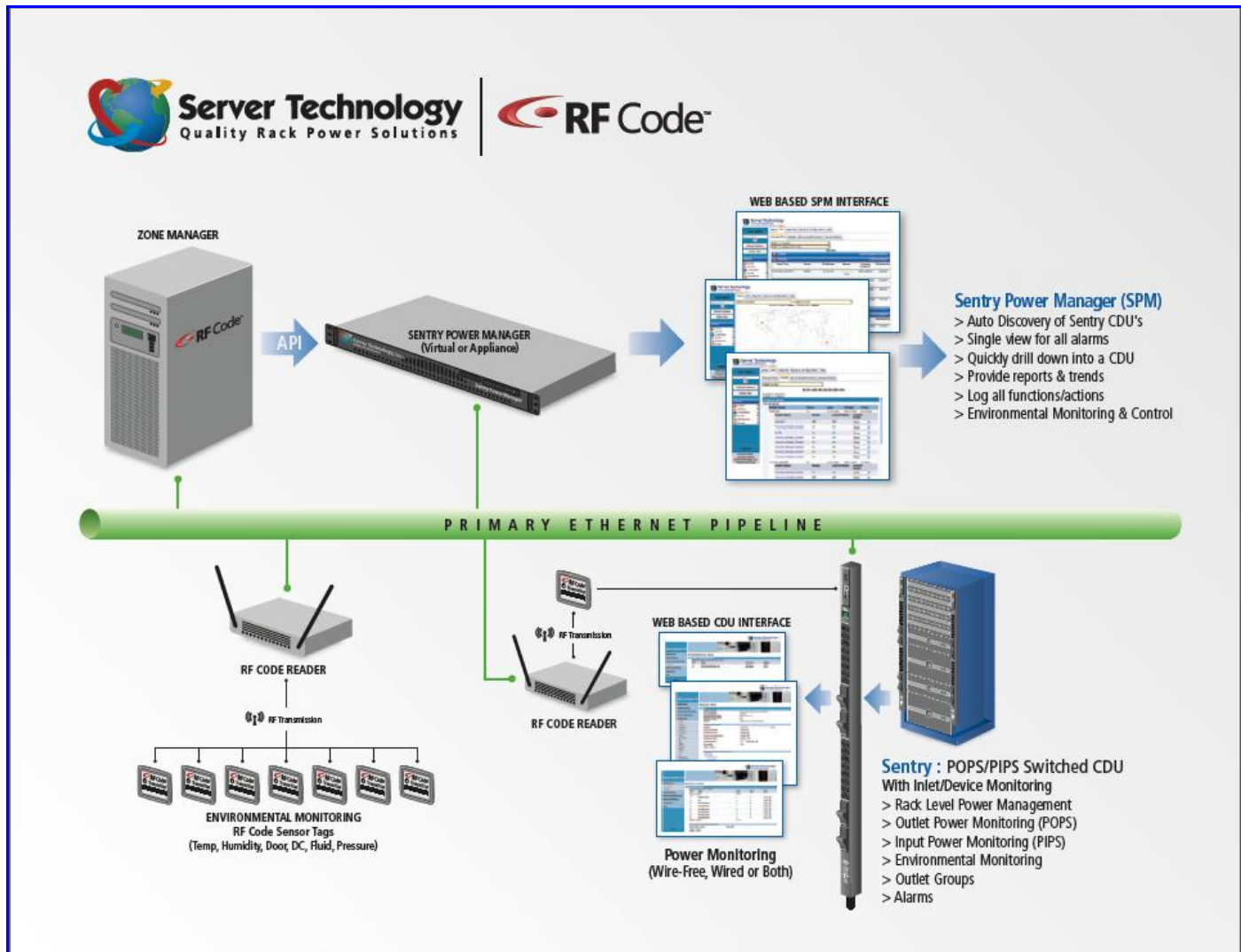
System Advantages

Sentry Power Manager (SPM) combined with the wire-free solution provides a single and centralized view of power consumption from the CDUs at the device level or cabinet level and offers the following benefits to the data center:

- Rolls up power (from Server Technology CDUs) and environmental data (from RF Code sensors) into one view.
- Assists in capacity planning and power management.
- Determines and forecasts power consumption.
- Provides efficiency data, for example, cooling metrics.
- Allows the location of stranded power capacity.
- Assists in meeting regulatory requirements.
- Helps to reduce capital expenditure.

System Architecture

The following illustration shows the integrated system architecture for the wire-free solution. Server Technology CDUs and SPM are integrated with RF Code's multiple sensor tags, readers, open API, and Zone Manager software to monitor, track, and report power usage and environmental data through the SPM interface:



Why Monitor Power?

In addition to the responsibility for energy consumption that reflects on corporate image and brand value, data centers need detailed and accurate information about power usage for the critical reason of rising energy costs.

Consider the following:

- Square-foot energy costs are 30 to 80 times greater for a data center than for a typical office.
- The cost of electricity and the supporting infrastructure in a data center for only three years surpasses the capital cost of server and other equipment acquisitions.
- The EPA indicates that data centers account for 1.5% of annual U.S. energy consumption.
- Data Centers are required to comply with environmental agencies and their regulations, such as The Green Grid and Energy Star.

Before You Begin

Note the following items before getting started with the wire-free monitoring solution:

Request the SPM License Key

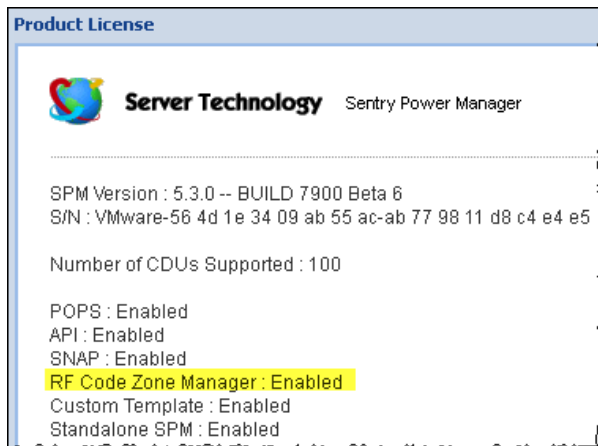
To use the solution, an SPM software license key must be purchased from Server Technology. For information about the license key, contact your Server Technology representative at:

1-800-835-1515 (domestic),

++0 (1) 775.284.2000 (international), or

sales@servertech.com

When the solution is operational, the SPM Product License box displays “RF Code Zone Manager: Enabled”



Equipment You Will Need

Server Technology Products:

Cabinet Distribution Units (CDUs)

- Any intelligent Smart or Switched CDU, with or without PIPS/POPS technology.

Notes:

- The CDUs listed above measure current (A), voltage (V), power factor, apparent power (VA), active power (W), and accumulated energy (W-hr).
- Master only or master/link CDU configurations will work in the monitoring solution.
- If using Switched CDUs in the monitoring solution, there will be no outlet control (the wire-free infrastructure is a 1-direction protocol).

Software

- Sentry Power Manager (SPM) enterprise software product, version 5.3 and greater.

RF Code Products:

Wire-free Devices

- Small battery-powered sensor tags
- Networked readers

Software

- Zone Manager software product (with open API)

For the Connection

To connect the RF Code Zone Manager to SPM through the open API, you will need a hostname (or IP address), port number to talk on, and username/password.

Working with RF Code Devices

This section describes the sensor tags, readers, and Zone Manager software provided by RF Code for use in the wire-free monitoring solution.

RF Code Sensor Tags

The RF Code sensor tags are small, low cost devices. Tags are available in a wide range of styles and mounting options for easy and flexible deployment anywhere in the data center.

The wire-free design eliminates wired connections and IP address overhead to each CDU. With a patented communications protocol, the sensor tag has an exceptional RF range and performance around dense metal environments, such as data center racks and servers, even functioning when placed inside a fully enclosed rack.

Depending on the type of sensor tag, the device life ranges from 3 to 5 years. Tags have a field-replaceable battery and a standard 10-second beacon rate. Mounting options include adhesive, zip-tie lanyard, and screw attach plate.

Sensor Tag Styles

Shown here are a few styles of the RF Code sensor tags available for flexible deployment in the data center. Each style can be integrated with SPM and the wire-free monitoring solution:



Specialized Sensor Tag Models

The following RF Code sensor tag models are specialized to collect readings for equipment, power, and environment:

This RF Code sensor tag ...	does this ...
R120 Door Sensor Tag	Provides door open/closed status for room doors and PDU racks for tracking access attempts.
R130 Dry Contact Sensor Tag	Monitors the open/closed states of dry contact devices for reporting on the open/closed state of a device.
R135 Fluid Sensor Tag	Notifies leak detection and also notifies the dry/clear status.
R150 Temperature Tag	Monitors temperature-sensitive assets in equipment racks.
R151 Tethered Temperature Sensor Tag	Reports temperature readings from dense areas hard to access like inside ductwork.
R155 Humidity and Temperature Tag	Monitors the ambient temperature and relative humidity of the environment.
R160 Air Pressure Sensor Tag	Reports on differential air pressure between two points.

Note: A unique sensor tag for asset tracking is also available from RF Code.

RF Code Wire-Free Readers



The active RFID readers are high-density with an integrated rules engine. Wired, wire-free, and POE models are available.

The readers use the RF Code open API to receive and collect sensor readings from all deployed and active RF Code sensor tags throughout the data center. The readers then transmit collected data to the Zone Manager software product.

The readers connect to an IP network with multiple, simultaneous connections.

Typically, the wire-free monitoring solution allows for one Zone Manager and many readers positioned around the data center. Each wire-free reader can handle 1,400 sensor tags and is capable of a wide communication range, covering from 3,000 to 5,000 square feet.

RF Code Wired Reader

In addition to the wire-free models, a wired reader model is available for connection to the Ethernet. The wired device can be deployed to transmit sensor tag data at distances up to 1,000 feet.

RF Code Zone Manager Software



The Zone Manager is the RF Code software product that collects and organizes environmental readings received from deployed readers. The product then provides 1-way reporting through its open API directly to SPM.

Considered to be the middleware component in the wire-free monitoring solution, the Zone Manager functions as the networked location engine that manages all deployed readers in the system.

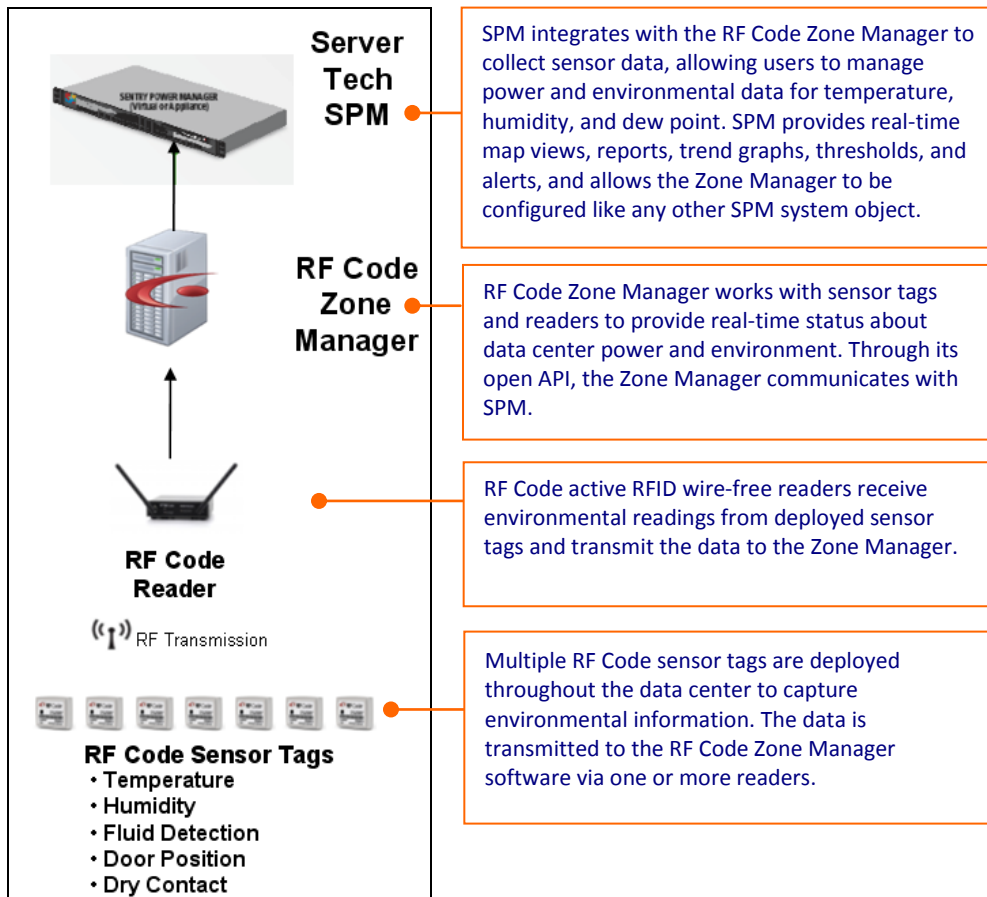
CDU readings are rolled-up by the Zone Manager and sent to SPM where lower critical/warning and upper warning/critical thresholds for temperature, humidity, and dew point are reported. Also reported are battery time thresholds and sensor status.

The Zone Manager has configurable rules, allows for the reduction of data, and operates with a subscription interface. The software can also provide Change Value Reporting.

System Integration with SPM

Sentry Power Manager (SPM) version 5.3 and greater supports the monitoring of RF Code sensor tags. Once SPM is integrated with the RF Code open API via the purchased software license key, the monitoring infrastructure and deployed tracking devices are automatically available. Data center power and environmental information can then be managed from one central location using the SPM user interface.

The following graphic shows the system architecture of SPM when integrated with the wire-free monitoring solution:



How SPM Handles the Zone Manager

Through RF Code's open API, SPM supports sensor tag data retrieved through the Zone Manager. The presence of a Zone Manager triggers SPM to open the connection to the monitoring solution and start communication with the Zone Manager. For a connection to occur, the Zone Manager must have a hostname (or IP address), port number to talk on, and username/password.

A single Zone Manager can have multiple readers communicating with it through the open API connection. The Zone Manager discovers deployed and active RFID readers and auto-populates the readers. Although a Zone Manager can function without readers, sensor tags cannot communicate power and environmental readings to the Zone Manager (and then to SPM) without an active reader as the transmission device.

Identifying a Zone Manager in SPM

Once you add a new Zone Manager to SPM, the Zone Manager is treated as a system object that can be configured like other system objects such as CDUs, cabinets, and locations.

The following SPM screen capture shows a Zone Manager added to SPM and displayed in the Zone Managers List.

Access the list at **SPM > System Setup > Zone Managers**.

The screenshot displays the Sentry Power Manager (SPM) web interface. The top navigation bar includes the 'Server Technology' logo, the title 'Sentry Power Manager', a search bar, and a dropdown menu set to 'By CDU Name'. The left sidebar contains a list of applications: Views, Device Selection, Setup Items, Reports Menu, System Setup, System Setup, Custom Device Templates, Zone Managers, and Zone Manager Readers. The main content area is titled 'Zone Managers' and features a table with the following columns: Name, Host, Version, Status, Port, Server Type, and User Name. A single entry is listed: 'RF CODE Test system' with a status of 'OK' (green checkmark), host 'am2.rfcode.com', port '6580', server type 'HTTP', and user name 'rfcode'. The table also includes a 'Clear All' button and a 'Items Per Page' dropdown set to '20'.

Name	Host	Version	Status	Port	Server Type	User Name
RF CODE Test system	am2.rfcode.com	Zone Manager - Release:2.7-ZM_2012...	OK	6580	HTTP	rfcode

How SPM Handles the Readers

When the Zone Manager connects to SPM, you do not have to add RF Code readers to SPM. The readers associated with the Zone Manager are automatically uploaded to SPM. The Zone Manager discovers its own active RFID readers in the data center, auto-populates the readers, and tracks them as part of the system.

Identifying Readers in SPM

Active RF Code readers for the wire-free monitoring solution are automatically added to the SPM user interface by the Zone Manager.

Unlike Zone Managers, SPM does not treat active RFID readers as configurable system objects; therefore, you can only view the readers and delete them from the list when necessary.

The following SPM screen capture shows readers associated with the Zone Manager and displayed in the Zone Manager Readers List with pre-assigned names from RF Code.

Access the list at **SPM > System Setup > Zone Managers > Zone Manager Readers**.

These pre-assigned names from RF Code identify readers deployed in your data center specifically as part of the wireless monitoring solution. The RF Code Zone Manager automatically adds these readers upon connection to SPM through the Zone Manager software and SPM displays the readers in this list. The Zone Manager stores and configures all readers for connection to the wireless solution, so the only user action you can perform on a reader is to delete it from this list.

Reader ID	Name	Host Name	Port	Status	E...	Zone Manager	Noise (Cha... A)	Noise (Ch... B)
\$zReaderM250_ea90a091b828c01e	PDU Demo Rea...	192.16...	7...	CONNECTING	Yes	am2.rfcode.com	n	n
\$zReaderM250_7fb7b400969b6de3	PDU Demo Rea...	192.16...	7...	CONNECTING	Yes	am2.rfcode.com	n	n
\$zReaderM250_ea90a091b828c01e	PDU Demo Rea...	192.16...	7...	CONNECTFAI...	Yes	am2.rfcode.com	n	n
\$zReaderM250_7786b29e69506afc	PDU Demo Rea...	192.16...	7...	CONNECTFAI...	Yes	am2.rfcode.com	n	n
\$zReaderM250_16f8795ec36366a0	PDU Demo Rea...	192.16...	7...	CONNECTING	Yes	am2.rfcode.com	n	n
\$zReaderM250_32c68acd28da2437	DC Demo Reader	192.16...	6...	ACTIVE	Yes	am2.rfcode.com	-115	-115

SPM reports the following attributes of RF Code readers:

- ID (name)
- Hostname (IP address)
- Port
- Status
- Enabled
- Noise
- Event rate
- TAG capacity
- Firmware version
- Connected address (IP address)
- Connection encryption flag
- GPS status

How SPM Handles the Sensor Tags

SPM periodically collects sensor tag data through RF Code's Zone Manager, automatically adds new tags to its database, and updates parameters for existing tags.

RF Code sensors tags are treated in SPM like any other sensor on a CDU or environmental monitor. Once in SPM, RF Code sensor tags are fully tracked and managed for use in the monitoring solution. Sensors can be monitored, edited, or deleted, and you can place sensors in a Location system object for easier management.

Identifying Sensor Tags in SPM

The RF Code Zone Manager automatically adds sensor tags to SPM. The following SPM screen capture shows the sensor tags displayed in the SPM Sensors List with pre-assigned names from RF Code.

Access the list at **SPM > Device Selection > Sensors** or **SPM > Setup Items > Sensors**.

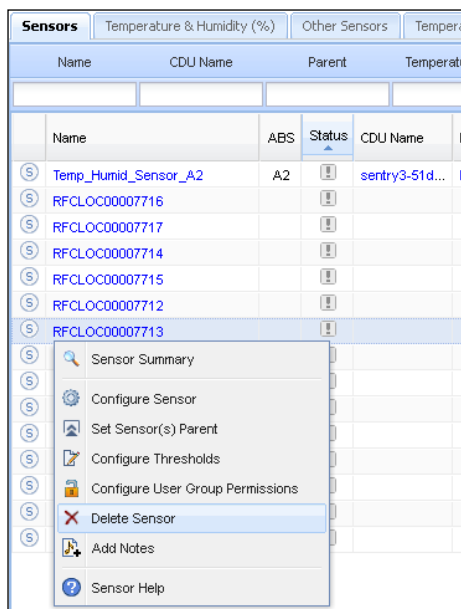
Example of user-assigned names for two SPM-originating sensors that were placed on SPM-discovered CDUs or Environmental Monitors. These sensors are not part of the wireless monitoring solution.

Name	ABS	Status	CDU Name	Par...	Temperature (C)	Humidity (%)	Dew Point (C)	Pres...	Motion	Motion Count	Tamper	Panic	Low Battery
Temp_Humid_Sensor_A1	A1		senry3-51...	Mike	88.00	10.00							
Temp_Humid_Sensor_A2	A2		senry3-51...	Mike									
RFCLOC00007716									No		No	No	No
RFCLOC00007717									No		No	No	No
RFCLOC00007714									No		No	No	No
RFCLOC00007715									No		No	No	No
RFCLOC00007712											No	No	No
RFCLOC00007713											No	No	No
RFCLOC00007710											No	No	No
RFCLOC00007711											No	No	No
RFCLOC00007718											No	No	No
RFCLOC00007719											No	No	No
RFCLOC00007703											No	No	No
RFCLOC00007704											No	No	No
RFCLOC00007705									No		No	No	No

These pre-assigned names from RF Code identify sensor tags deployed in your data center specifically as part of the wireless monitoring solution. The RF Code Zone Manager automatically adds these sensor tags upon connection to SPM. The RF Code sensor tags can be configured as a system object like any other SPM-originating sensor.

Reported Sensor Tag Data

- SPM reports the following information about sensor tags:
- Thresholds (lower critical/warning–upper warning/critical) on temperature
- Thresholds (lower critical/warning–upper warning/critical) on humidity
- Thresholds (lower critical/warning–upper warning/critical) on pressure
- Battery time thresholds
- Thresholds roll up to a sensor status reading
- Temperature, humidity, and dew point

Unresponsive Sensor Tags

Sensor tags can fail to respond to the system when they have dead batteries, accidental displacement (a tag is knocked off a wall), or other physical device issues.

Tags in the failed state may not be reporting to the readers but they are still valid tags; therefore, SPM will not automatically delete failed sensor tags. When necessary, you have to delete a tag manually from SPM.

As illustrated on the left, to delete a sensor tag, right-click the RF Code tag you want to delete in the Sensors list, and from the drop-down menu, select the Delete Sensor option.

SPM User Reports

- The “Sensors – Environmental” user report includes RF Code sensor tags along with regular STI sensors used on CDUs and environmental monitors.
- RF Code sensor tags are included in thresholds (for email alerts) with temperature, humidity, and dew point.
- Low critical, low warning, high critical, and high warning statuses are reported for RF Code sensor tags.

SPM Trend Reports

- SPM will generate a trend report for temperature, humidity, and dew point if any or all are present from the RF Code sensor tag.
- SPM does not trend RF Code Zone Managers or RF Code readers.

Reference Links

For information about:

- RF Code and the wireless monitoring solution, see www.rfcode.com
- Obtaining a software license key to enable this solution, contact Server Technology at:
1-800-835-1515 (domestic),
++0 (1) 775.284.2000 (international), or
sales@servertech.com
- Sentry Power Manager (SPM) – Server Technology’s enterprise management software product, see:
www.servertech.com/products/sentry-power-manager
- Server Technology power management PDUs and services, see www.servertech.com

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