Data Center Monitoring

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June 2012

Overview

In data centers, avoiding downtime is critical. Temperature and humidity fluctuations and hot spots can wreak havoc on server hardware and cause costly outages. Additionally, increased power consumption not only leads to increased operating costs but can be an indication of an impending problem. Good airflow is vitally important and must be monitored to ensure air exchange is handled properly. Flooding or wetness in a data center could be disastrous. Wireless Sensors breakthrough sensor network can be easily deployed in data centers—providing critical environmental data and alerts, reducing costs, and ensuring server uptime.

This white paper will address the following topics:

How Wireless Sensors makes monitoring of critical data both easier and more cost effective
Advantages of Wireless Sensors versus other monitoring systems
How Wireless Sensors applies to data center monitoring

Wireless Sensors Eases the Monitoring of Critical Environmental Data

Wireless Sensors provides a robust, highly reliable platform to monitor critical data in environments such as data centers. Wireless Sensors provides many advantages over traditional monitoring systems:

Cost Savings—Traditional monitoring systems typically require the costly process of pulling wire through the facility. Wireless Sensors' wireless architecture eliminates the need for this.

Ease of Installation—Wireless Sensors' breakthrough technology allows for quick and easy installation. Wireless Sensors can typically be installed in a matter of hours.

Flexibility—Wireless Sensors Smart Sensors can be located virtually anywhere, allowing you to monitor locations that may have been too costly to monitor in the past. Wireless Sensors can also be easily re-configured and re-located as monitoring needs in the environment change.

Data Connectivity—Wireless Sensors integrates with many in-place software and/or HMI systems through the use of ModBus TCP, OPC, ODBC, web services or FTP/HTTP Post.

Reliability—Wireless Sensors has been shown to have 99.99% data reliability.

Wireless Sensors provides a data conduit to third-party monitoring systems through the many protocols supported which are outlined above. Collected data can then be used by these applications for real-time monitoring, trending, report generation, and alarm generation. Wireless Sensors is the leading wireless sensor networking platform, providing extremely reliable and secure data reporting through our Smart Sensors, Mesh Routers and Gateways. Wireless Sensors is changing the way companies monitor data that is critical to their success.

Wireless Sensors and Data Centers

Wireless Sensors is a natural fit for data center monitoring applications. Wireless Sensors Smart Sensors can be deployed easily in any location. IT equipment today operates at a high power density, causing hot spots to form in each server racks. The heat generated has a major impact on uptime of equipment. Monitoring temperature, humidity and power consumption on individual racks is crucial. Additionally, data centers are typically dynamic environments—floor layout can change regularly as more capacity is added. Wireless Sensors' scalable architecture not only allows for easy re-positioning of monitoring points, but also easy integration of additional monitoring points.

In typical data center applications, integrated Temperature and Humidity, RTD Temperature 0-10V 4-20mA Current and Contact Closure Smart Sensors are deployed. Mesh Routers are also deployed to form a solid wireless backbone and increase network robustness by providing multiple paths to the Gateway, which is used to collect data and configure the network. Configuration and monitoring of data is achieved through the Gateway's web interface. These building blocks combine to form a Wireless Sensors Network. An overview of a Wireless Sensors Network can be seen in Figure 1.

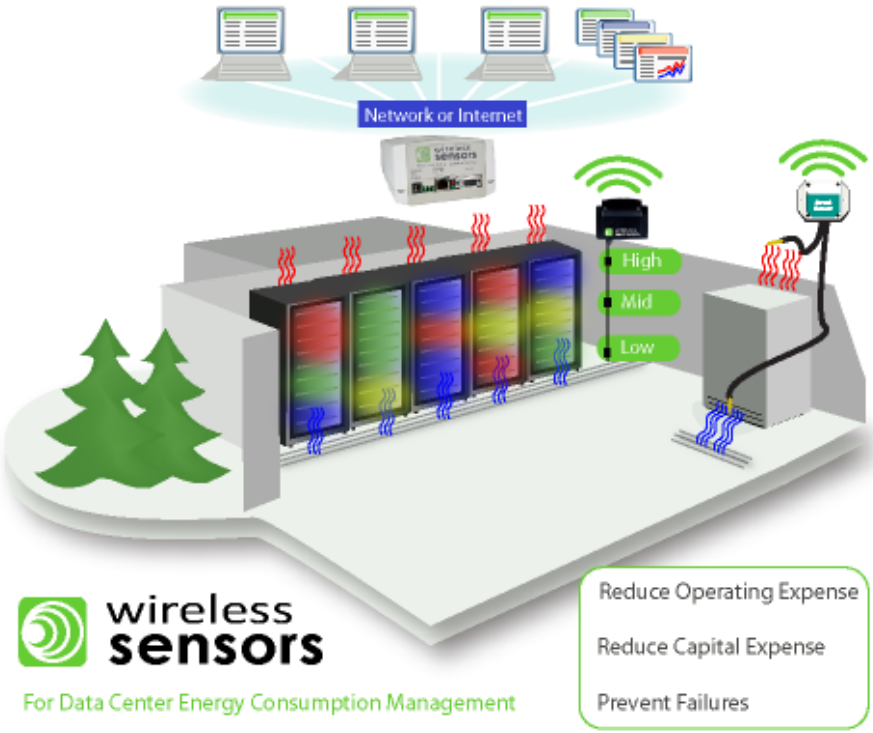

Figure 1: A Wireless Sensors network

Monitoring temperature and humidity can be achieved through use of integrated temperature and humidity Smart Sensors. In areas where only temperature data is needed, typically a temperature only Smart Sensor is used in conjunction with a standard RTD or Thermistor probe. This makes it easy to monitor temperature in several places in a server rack or in adjacent server racks. They are typically deployed around server racks to monitor the temperature and humidity in the area of the racks, and also around the data center to monitor the ambient environment.
Monitoring energy consumption is achieved by using a current transducer or power meter and either a voltage or current input Smart Sensor. A current transducer is a device that generates a voltage signal that is proportional to the amount of current running through a power cable. The

voltage output of the current transducer is then wired into a voltage input Smart Sensor and the power being used is calculated by the monitoring software application using the collected data. If loop power is available, power meters with a 4-20mA output can be wired to current input Smart Sensors. In this case the power consumption calculated by the power meter and a proportional 4-20mA output is generated. The value can then be scaled in the monitoring software. Monitoring power is important as increased power use not only causes heating but is an indication that an equipment failure is imminent.

Wetness in the vicinity of the server racks can be monitored with a contact closure, current or voltage input Smart Sensor, depending on the type of wetness sensor you choose to use. Wetness sensors that indicate wetness via a dry contact would interface with a current input Smart Sensor. Similarly, wetness sensors that indicate wetness via a current or voltage signal would interface with their respective Smart Sensors. These values are then fed into the monitoring software.

Airflow can be monitored through the combination of flow meters and Smart Sensors. The flow meter outputs a signal between 4 and 20mA that is proportional to the amount of airflow it detects. The mA signal is then input to the current input Smart Sensor and can then be scaled to the appropriate value in the monitoring software.

A typical Wireless Sensors deployment monitoring temperature, humidity and power is shown in Figure 2. A combination of Smart Sensors are used to monitor temperature and humidity, and voltage input smart sensors are deployed with current transducers to monitor power consumption. MESH Routers are deployed at various locations to provide multiple paths back to the Gateway and flexibility should the physical environment change (e.g. server racks being added/moved).

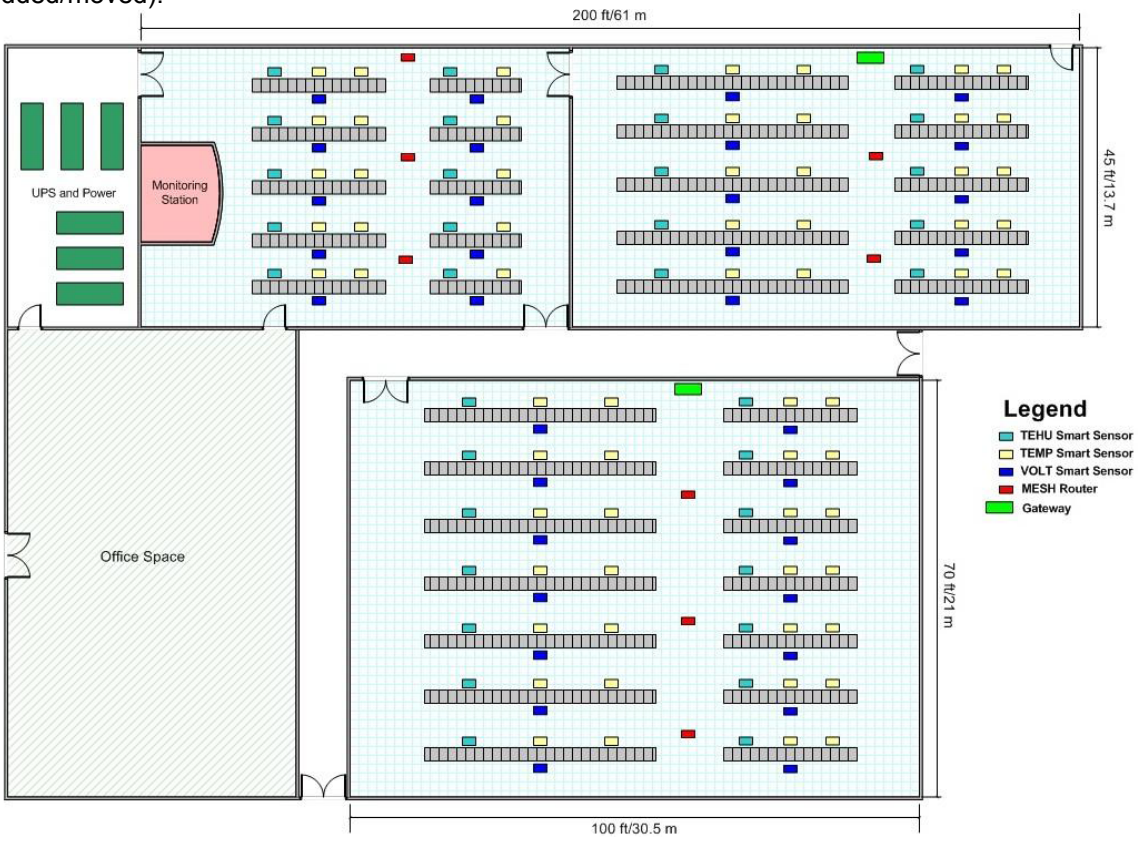

Figure 2: A Wireless Sensors deployment monitoring Temperature, Humidity, and Power Consumption (using CTs and VOLT Smart Sensors) in a data center

Driver	Benefit	Feature Required to Deliver Benefit
Reduce Op Ex	▪ Optimize cooling distribution system	▪ Granular temp measurements at low deployment costs
	▪ Optimize CRAC	▪ CRAC supply and return temperature ▪ CRAC chilled water supply return temp ▪ CRAC thermal performance
Reduce Cap Ex	▪ Wireless devices non-invasive installation reduces TCO of monitoring systems	▪ Scalable, low cost, easy to deploy with long battery life ▪ Stand alone system or integrate with existing third party systems and applications
Prevent Failures	▪ Alert excessive ambient conditions	▪ Granular temperature measurements
	▪ Alert access intrusion	▪ Sense room access
	▪ Alert anomaly in air distribution system	▪ Granular temperature measurements

Summary

The Wireless Sensors Wireless Sensor Network is ideal for monitoring temperature, humidity, power consumption, airflow and wetness in data centers. Wireless Sensors is a highly reliable, highly secure wireless monitoring system that can be easily deployed through a combination of Smart Sensors, MESH Routers, and Gateways. Quick deployment, cost savings, and modularity are just a few of the advantages Wireless Sensors provides over traditional monitoring systems due to its wireless architecture. Wireless Sensors allows you to quickly and effectively monitor critical data that ensures data centers stay up and running 24 hours a day, 365 days a year.