Deployment Methods for Environmental Monitoring:

Which One is Best for My Application?

A Vertiv Application Brief

There is not a one size fits all approach to monitoring... it depends on the goals and requirements of each specific application.

This application brief discusses the pros and cons of three types of environmental monitoring systems while providing an overview of Vertiv™ Geist™ solutions.

Challenge

Data centers are increasingly aware of the need to monitor environmental conditions in real-time. Monitoring these conditions helps identify areas that may have heating issues, stranded cooling capacity and other environmental risks.

There are typically three options when it comes to selecting an environmental monitoring system:

1. Dedicated monitoring appliance with wired sensors
2. Intelligent Rack Power Distribution Unit (rPDU) with hard wired monitoring capabilities
3. Wireless sensor gateway

Each type of system has its pros and cons. There is no inherent correct choice of which type of monitoring to deploy, instead it depends on the goals and requirements of each specific application.

1. Dedicated Monitoring Appliance with Wired Sensors

Wired environmental monitoring systems provide secure communications, reliable data and have a direct power source. They are beneficial for facilities with high security requirements. Wired systems are typically more dependable than wireless, as a physical connection limits over-the-air interference that could prevent or slow data communication. Wired solutions, along with the connected sensors, are powered directly rather than using batteries. This eliminates the need to replace batteries every few years.

Depending on the implementation conditions within the data center and surrounding facility, standalone wired systems can be costly to implement. Running cable, using network switch realty and using rack space all add cost to each deployment. The hardware can also be tedious and time consuming to initially configure. Post-initial implementation, wired solutions do not have the same level of flexibility when adding additional sensors, becoming more difficult to scale. Moving wired devices takes more planning and coordination of multiple resources, which compounds based on the size of the system. In conjunction, growing a wired system becomes costly and time consuming for the same reasons. Lastly, cables can become damaged, loose or unplugged which can cause failures. The cost to diagnose cable issues can be significant based on the size of the facility and the organization of the wiring.

PROS				CONS		
Secure	Reliable	rPDU Monitoring Capability	Direct Power Source	High, Indirect install and Upkeep Costs	Difficult to Scale	Potential for Wiring Issues

2. Intelligent rPDU with Monitoring Capability

Many customers choose to use existing, intelligent power distribution units within the rack as the hosts for environmental monitoring. Many Monitored and Switched rPDUs have built-in capability to attach wired monitoring sensors. Each unit's environmental sensor ports provide data center managers with the ability to track critical climate variables like temperature, airflow, humidity and dew point with the use of an external sensor. This becomes advantageous because a standalone monitoring device does not have to be purchased, connected to the network and monitored individually.

Using intelligent rPDUs allows users to take advantage of the existing intelligence at the rack level and gather data through the network connection of the rPDU. Alarms, alerts, and live values can all be sent through the rPDU. No additional network cables are required, along with eliminating the need to connect to expensive switch ports.

This method increases the number of communication points for the monitoring system – as sensors will be placed on multiple rPDUs, rather than one standalone monitoring unit. In most scenarios, this is viewed as an advantage. There exists a single point of failure when using a standalone unit (i.e., if the host device fails to communicate, so do all the connected sensors). However, if communication fails on one rPDU when using multiple, intelligent rPDUs, the monitoring system only fails for the limited number of connected sensors. The higher number of communication points become a disadvantage when users cannot access all rPDUs within a single interface. This can be solved using a DCIM solution which aggregates all data into one screen.

PROS				CONS
Lower Cost to Implement	Uses Existing Communication	No Requirement to Utilize Additional Switch Ports	No Single Point of Failure	Potential Management Challenges From Using Multiple Interfaces

3. Wireless Sensor Gateway

Wireless monitoring has come a long way in the past few years with improved security and reliability. Newer wireless technology typically uses 128-bit encryption to protect data. Data is communicated via the wireless devices' own signal rather than using the same signal as other infrastructure in the building. Reliability has also been improved with early fault detection of failing sensors so errors can be detected and resolved quickly before corrupt data is reported as valid.

Technologies that improve the range of wireless systems have also improved in the past few years. With better technology, wireless monitoring networks can receive data from hundreds of individual sensors decreasing the need to configure numerous monitoring networks.

One of the biggest advantages of wireless monitoring is the ease of deployment. When deploying environmental monitoring in a new data center, a wireless solution can reduce and simplify install times and effort by eliminating unnecessary wiring. Removing the need to run cable means decreased deployment cost and fewer install personnel.

With no wires, moving devices after install is simple and quick. Retrofitting an existing data center where the majority of the network switches are at capacity and rack space is at a premium becomes easier with a wireless solution. The increased flexibility goes hand-in-hand with scalability. Growing a wireless system is straightforward since new cabling does not need to be pulled. As an added benefit, wireless pricing has become more competitive in recent years.

The challenges with wireless systems include higher initial hardware costs when compared to wired monitoring solutions. Also, batteries are required to power the sensors, which typically require replacement every three to five years; although newer technology has begun to increase duration. Interference can also occur based on the layout of the facility or the addition of walls, structures or large devices. A previously stable wireless sensor could start to have issues as new devices, structures or objects are added or moved within the facility; troubleshooting these interferences can take time. Although security is much improved, wireless communication in the data center might remain a concern for some users.

PROS				CONS			
Easy to Deploy	Flexible	Scalable	Lower Indirect Costs	High, Initial Hardware Costs	Powered with Batteries	Communication Range Can be Hindered Based on Facility Layout	Not as Secure as Wired

The Vertiv Geist Solution

The Geist Monitoring product line has a number of quality products to choose from based on your deployment requirements.

Wired

The Geist standalone monitoring systems provide built-in temperature, humidity, and dew point monitoring with the ability to add additional monitoring capabilities with external Plug-n-Play sensors and Dry Contact/ 0-5V sensors. The comparison chart shows a brief overview of each of the wired solution's capabilities.

Wired to a PDU

Geist offers a wide range of intelligent power distribution units equipped to accommodate a variety of wired sensors including, but not limited to, temperature, humidity and airflow. Use the Geist PDU Finder to select which rPDU is right for your power and environmental monitoring needs.

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	Feature	Watchdog 15	Watchdog 100
On-Board Sensor	Temperature	•	•
	Humidity/Dew Point	•	•
External Sensor	# Plug-n-Play Sensor Ports	2	2
	Max Plug-n-Play Sensor Capacity	4	4
	# Dry-Contact/0-5 V Sensor Ports	0	4
Hardware	Built-in PoE	Optimal	Optimal
	Dry-Contact Relay Outputs	0	1
	Rackmount 19" 1U		•
	Ethernet	10/100	10/100
Web Server	USB		
	IPv6	•	•
	HTTP/HTTPS	•	•
	DHCP	•	•
Firmware	JSON API	•	•
	Real Time Sensor Data Feeds	•	•
	Sensor Data Logging & Graphing	•	•
	Data Logs	CSV, JSON	CSV, JSON
	SNMP (v1, v2c, v3)	•	•
	Email & Email-to-SMS Alerts	•	•
	Alarm Escalations	•	•
	Alarm Repeat	•	•
	Alarm Delay	•	•
	Alarm Valid Hours	•	•
	Periodic Email Status Reports	•	•
	Encryption via TLS	•	•
	Login Security	3 Admin, Control, View Only	
	Compatible with Device Director	•	•
Benefits	FREE Firmware Updates	•	•
	FREE Technical Support	•	•
	Warranty	5 Years*	
Reg	Regulatory Compliance	UL, FCC, CE, RoHS	

**Extended warranties available | **Temperature Range -40°F to 185°F (-40°C to 85°C)*

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