



SmartZone™ DCIM Cooling Optimization

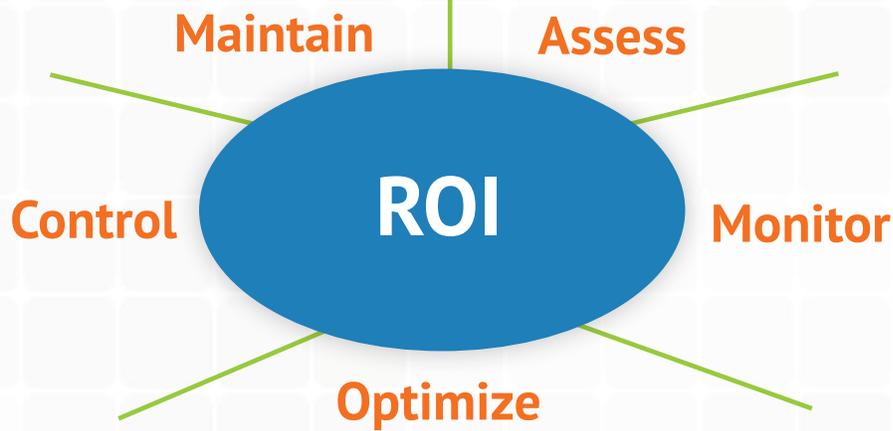
Save Energy with Increased Cooling Capacity

PANDUIT®

infrastructure for a connected world



- ⌘ In a recent Uptime Institute survey, 71% of respondents listed “Improving capacity planning” as a top driver for buying DCIM¹.



The Need for a Better Approach to Data Center Cooling

The standard approach to data center cooling has been to keep data centers at a constant, cold temperature. However, as energy prices rise and as capacity concerns become more prevalent, data center operators need a better solution than this one-size-fits-all approach. As part of their Data Center Infrastructure Management (DCIM) process, operators need a way to address common concerns such as hot spots, humidity fluctuations, and air delivery problems while keeping costs and energy usage low within their current data center footprint.

The Panduit® SmartZone™ DCIM Cooling Optimization solution helps data center operators improve energy efficiencies and optimize cooling capacity using SynapSense®, a turnkey, wireless monitoring and cooling control solution for data centers that uses intelligent software, leading-edge wireless nodes and professional services.

With a proven track record of achieving rapid ROI, SmartZone™ DCIM Cooling Optimization offers a simple, staged approach to reclaiming stranded cooling capacity and avoids the capital expenditures associated with purchasing new equipment.

- **Assess** project and energy savings and ROI
- **Monitor** baseline and trending data center conditions through instrumentation
- **Optimize** airflow management and energy savings through Panduit Thermal Management Solutions
- **Control** cooling through automated systems that align cooling capacity with changes in IT load
- **Maintain** the optimized state through on-going services



Performance that Aligns to Your Strategy

Cooling optimization starts with Panduit Services that can help you understand the unique needs of your data center and help determine a course of action to appropriately align to your data center strategy.

Case Study:

Panduit's highly qualified DCIM experts start by developing a DCIM maturity roadmap that focuses on delivering manageable, measurable, and cost-effective DCIM capabilities aimed at growing the actionable information you need, as you need it.

These levels of cooling maturity include:

Maturity Level 1:

Setting alarms and alerts to basic thresholds and using software mapping to stay ahead of potential cooling issues.

Maturity Level 2:

Determining areas that can be optimized for energy and cost savings or capacity recovery, such as airflow or floor balancing issues.

Maturity Level 3:

Automatically monitoring your data center to optimize energy savings and resiliency, replacing your cooling “buffer” with a system that automatically adjusts levels as needed.



Professional DCIM Services

Panduit Cooling Optimization Assessment Services initiates the optimization process by improving overall airflow management, which, once complete, results in energy savings by reducing VFD fan speeds and increasing CRAH temperature set points. Granular monitoring enables customers to operate with server inlet temperature closer to the upper band of the ASHRAE Range of 64.4° to 80.6° (such as 78°), resulting in increased cooling capacity. This optimization process has a proven track record saving up to 50% of cooling energy.

Once airflow management is optimized, SynapSense® SynapSoft® Software, a modular cooling platform within the Panduit® SmartZone™ DCIM Solutions Software Suite utilizes an Active Control™ feature to maintain a continually optimized state with added resiliency by dynamically aligning cooling capacity with changes in IT load. The final step in the process is resetting the new energy baseline and using solution metering to support the measurement and verification of that new baseline to substantiate the utility rebate.

- ❖ Organizations can lower operational expenses, including reduced cooling energy costs by up to 50%, via cooling optimization and power management.

The Benefits of DCIM Cooling Optimization

- Reduce cooling energy utilization up to 50%
- Identify and solve inefficiencies in your data center
- Avoid the need to purchase new equipment
- Automate management of CRAH temperature set points and variable fan speeds
- See trending views of recent or historical temperatures, pressure differentials, dew points, or humidity levels



Cooling Optimization with SynapSoft® Software

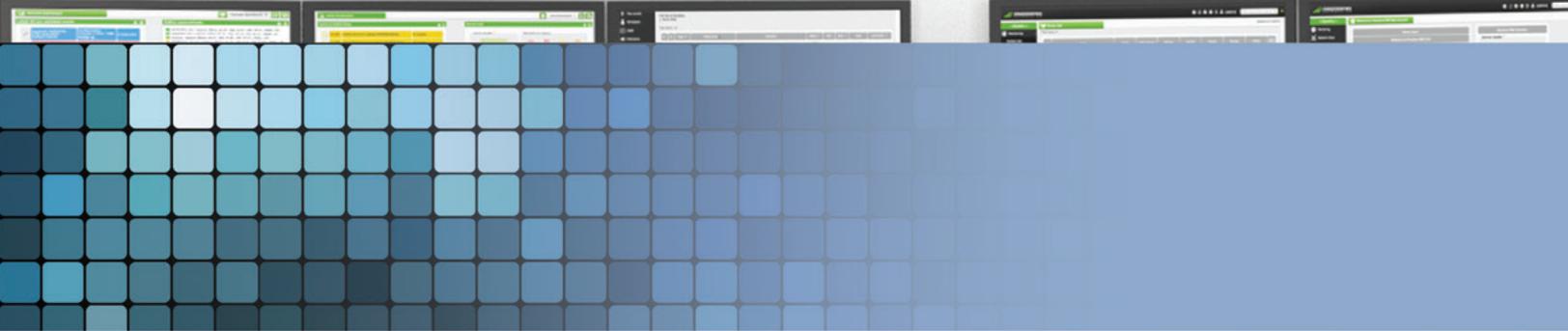
SynapSoft® Software works with SynapSense® wireless sensors and gateways to monitor, manage, and control cooling.

Dynamic Visualization of the Data Center Environment

The LivelMaging™ feature of the SynapSoft® Software provides real-time two-dimensional imaging of the sensor-monitored environment through use of a thermal map color gradient overlaid onto the data center floor plan image. This information can then be displayed via maps or animated movies of temperature, pressure differentials, and humidity levels to identify developing hot spots or anomalies in the data center. Operators have the unique ability to track an issue and play back the sequence of events leading up to the occurrence.

Automation of CRAH Temperatures and Set-Points

The Active Control™ feature of the SynapSoft® Software provides energy savings and increased efficiency by continuously aligning cooling capacity with changes in IT load. Using server inlet temperatures and subfloor pressure differentials, the software can manage CRAH temperature set points and variable fan speeds.



This unique approach optimizes cooling capacity and maintains cooling costs by minimizing the fan energy needed to meet server CFM and ASHRAE requirements.

The Active Control™ feature has built-in redundancy and failover safety mechanisms to minimize temperature control risks associated with fan motor failures, maintenance windows, perforated floor tile relocations, changes to IT load, and software patches and failures. The Active Control™ feature also includes alerts and alarms providing notifications to data center operators on a wide variety of operational issues.

Environmental monitoring reveals where/how much the safety buffer is used. Optimizing air flow and raising set points reduces use of the safety buffer.

Preferred Views of Sensors

Sensor views allow sorting by data type. This allows users to quickly create a preferred view with the most recent data or use historical data to view past trends such as high and low temperatures, pressure differential, dew point, and humidity.

Environmental Data Analysis Reports

Any number of sensors can be graphed using the “Data Analysis” functionality. The software console allows you to name and save a group of sensors for future reporting with a single click.

A Complete Data Center Metrics Dashboard

- The data center dashboard provides a comprehensive overview of conditions of the entire data center using calculated metrics, including:
 - Real-time PUE
 - Rack Cooling Index (RCI)
 - RCI_{HI}™
 - RCI_{LO}™
 - Moisture Index Hi/Lo, Recirculation Air
 - Ratio (RA), Bypass Air Ratio (BPA)
 - Air Loss Ratio (ALR)



Wireless Mesh Network

The SmartZone™ DCIM Cooling Optimization solution uses a wireless mesh network comprised of innovative SynapSense® Sensors and Gateways that clearly differentiate Panduit's DCIM solution from other DCIM vendor offerings.

Working with a modular SynapSoft® Software strategy, the SmartZone™ DCIM Cooling Optimization solution provides a new level of flexibility for customers. This strategy provides a hardware diagnostic platform that can easily be ported to take advantage of a broad range of off-the-shelf 8-, 16- and 32-bit microcontroller options.

These differentiators provide our customers with a completely integrated data set from every key piece of equipment, enabling a new level of management analysis and intelligence. The results increase customer options and add versatility to the solution while decreasing sensor solution costs.

Environment Nodes and Sensors

ThermaNode™ EZH is a wireless node that measures temperature and humidity within the data center without the need for wired cable assemblies and sensors (in most cases). Operators can install these nodes easily and quickly in most rack configurations. ThermaNode™ EZH also comes with an optional external sensor as an alternative installation method for open frame racks in data centers.

ThermaNode™: The SynapSense® ThermaNode™ measures temperature and humidity from the data center racks, CRACs/CRAHs, plenums, and other environmental areas. Battery-operated and wireless, the ThermaNode™ transmits temperature and humidity data via the SynapSense® Gateway to the SynapSoft® management software.



Pressure Node™: The SynapSense® Pressure Node™ measures air pressure differences between two points in the data center (subfloor and overhead plenums). Battery-operated and wireless, the Pressure Node™ transmits air pressure data via the SynapSense® Gateway to the SynapSoft® Management Software. Combined with other air pressure data collected, data centers can use this information to increase airflow efficiency.

Wireless Communication

The SynapSense® Intelligent Gateway relays data between wired and wireless networks. This wireless transceiver communicates with SynapSense® Environmental Sensors (temperature, pressure, and humidity) and power measurement devices to send data to the SynapSoft® management software. All SynapSense® wireless products communicate through the SynapSense® Intelligent Gateway. The SynapSense® Intelligent Gateway is also designed to buffer, retain, and resend data in the event that the data center Ethernet connection is lost, thereby increasing the resiliency of the data center by avoiding loss of critical data. Further, the gateway enables significantly larger wireless networks by allowing the interconnect of up to 200 ThermaNodes™ and 400 ThermaNode™ EZH nodes on a single wireless mesh network gateway through one single IP address, reducing the need for separate IP ports, IP capital costs, and management overhead. This results in increased cost effectiveness for data center operators as well as improved energy efficiency across the wireless sensor network.

Case Study: 15,000 ft2 Data Center

Problem

- Monitoring within the data center revealed .01-.045 inches of water in subfloor that was caused by uneven pressure and fans working at only 50% due to unbalanced raised floor

Solution

- Closed tile dampers and removed unnecessary perforated tiles, resulting in pressure improvement and lowered temperatures

Results

- Fan speed reduction of 35% on 26 units and 40% on four units 22% reduction in cooling cost

Livemaging™ visual mapping shows the dramatic improvement in subfloor pressure after optimization, resulting in fan speed and overall cooling cost reduction.



Optimize Cooling with Thermal Management

During the optimization stage, if efforts show that you need to replace or upgrade your existing physical components, Panduit Thermal Management Solutions offer a full range of cabinet, rack, and cable management systems for your data center.

Panduit cabinet systems offer containment, in-cabinet ducting, and improved sealing that optimize air separation and provide superior energy savings compared to other vendors' offerings. Optimized energy efficiency and capacity utilization begin with improved sealing. Even small air leaks within a cabinet will impact data center energy efficiency regardless of the heat load. Leaks allow hot air recirculation, which forces IT equipment inlet fans to work harder and consume more energy, limiting per-cabinet power utilization. To help resolve these issues, Panduit offers:

- **Cool Boot® Raised Floor Air Sealing Grommets** that minimize bypass airflow through cutouts in the raised floor
- **Net-Access™ Cabinets and Sealing Accessories** utilize blanking panels that seal space between rack units to prevent bypass air to improve energy efficiency
- **Net-Access™ In-Cabinet Ducting** that provides a cool air path to the air intakes on the sides of active cabinet equipment

By preventing hot air recirculation, you can realize a more consistent inlet temperature gradient across the entire front of the cabinet. This allows you to raise the data center set point. Additionally, as cabinet power densities rise, Panduit offers an optimal approach to containment through options such as:

- **Net-Contain™ Universal Aisle Containment (UAC)** offerings that ensure uniform cooling air temperature is delivered to equipment in high-density PODs, allowing full utilization of available cabinet space and cooling capacity

These containment options ensure that uniform cooling air temperature is delivered to equipment in high-density PODs, allowing full utilization of available cabinet space and cooling capacity.



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