Cooling Optimization Solutions

The SynapSense® Wireless Monitoring and
Cooling Control Solution
Thermal Management Solutions

"It's impossible for mere mortals to visualize how best to optimize the data center in real time. However, it's fairly trivial for computers..."

Joe Kava
VP of Data Center Operations,
Google — March 2016

Keep optimized through on-going services

Project and energy savings and ROI

Maintain

Assess

Baseline and trending conditions

Automated systems align cooling capacity with IT load

Control

ROI

Optimize

Monitor

Thermal management airflow and energy

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 environmental management strategy, operators are challenged to find 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 SynapSense™ Wireless Monitoring and Cooling Control Solution helps data center operators improve energy efficiencies and optimize cooling capacity through turnkey intelligent software, wireless nodes and unprecedented professional services.

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

Performance that Aligns to Your Strategy

Cooling optimization starts with understanding the unique needs of your data center and help determine a course of action to appropriately align to your strategy.

Our highly qualified experts start by developing a roadmap that focuses on delivering manageable, measurable, and cost-effective environmental management capabilities aimed at growing the actionable information you need, as you need it.

Environmental management roadmap example:

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

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

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

Once a roadmap is delivered, our team of experts initiate the cooling 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. Through granular monitoring, customers can operate with server inlet temperatures closer to the ASHRAE recommended range of 64.4°F to 80.6°F (18.0°C to 27.0°C) with 59.0°F dew point, resulting in increased cooling capacity. This process has a proven track record of saving up to 50% of cooling energy.
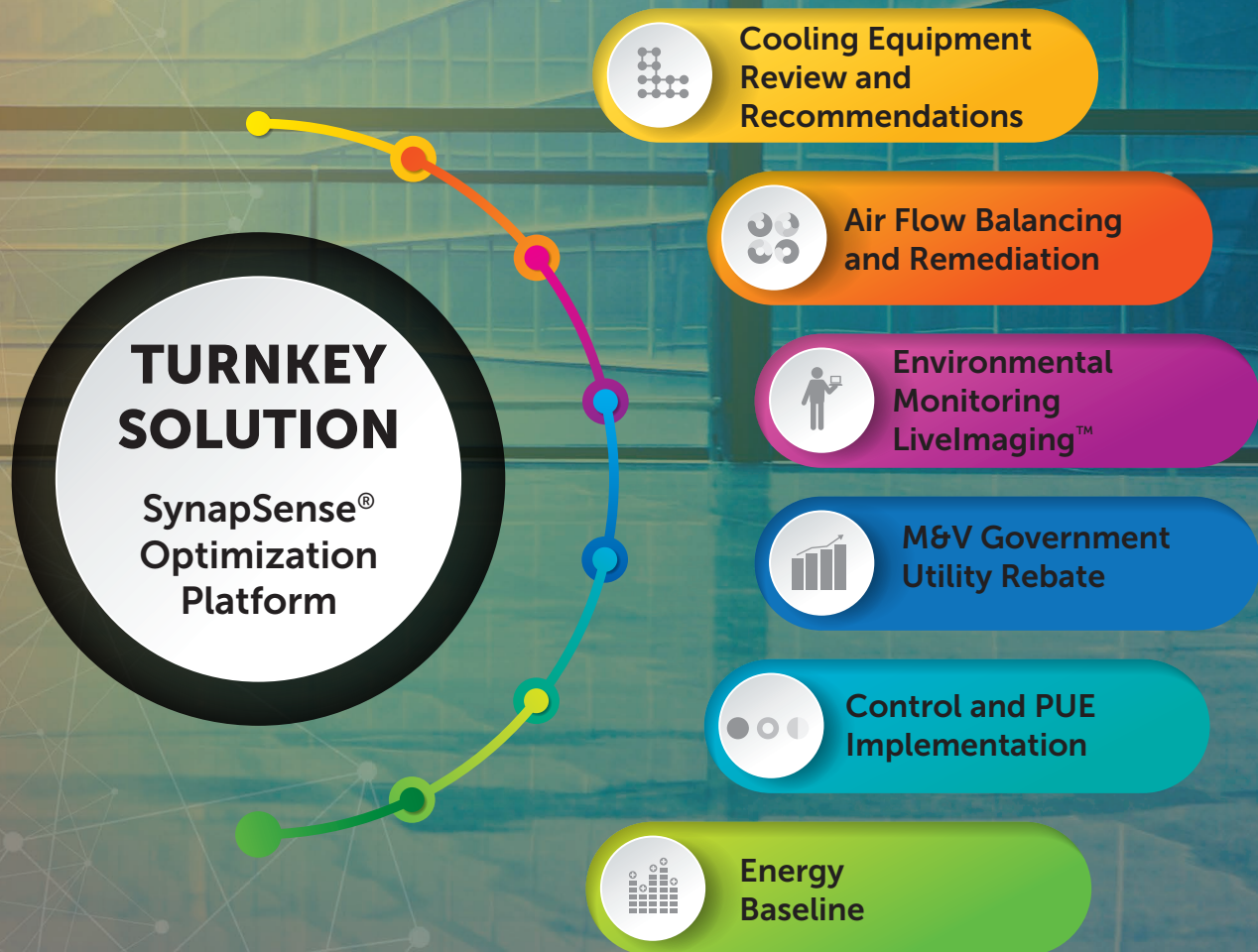
Automation of CRAH & CRAC Temperatures and Set-Points

Once airflow management is improved, operators continue to monitor and manage the data center environment through the SynapSense® Active Control™ Software feature. With built-in redundancy and failover safety mechanisms, Active Control™ Software mitigates temperature control risks associated with fan motor failures, maintenance windows, perforated floor relocations, changes to IT load and software patches and failures. The system also includes alerts and alarms providing operators with immediate notification to any operational issues. Using server inlet temperatures and subfloor pressure differentials, the software can manage CRAH/CRAC temperature set points and variable fan speeds. This approach improves cooling capacity and maintains cooling costs by minimizing the fan energy needed to meet IT equipment CFM and ASHRAE TC 9.9/EN-50600-2-3 requirements.

The Benefits of Cooling Optimization

- Reduce cooling energy use up to 50%

- Identify and solve inefficiencies in your data center

- Avoid the need to purchase new equipment

- Automate management of CRAH/CRAC temperature set points and variable fan speeds

- See trending views of recent or historical temperatures, pressure differentials, dew points, or humidity levels

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

TURNKEY SOLUTION

SynapSense® Optimization Platform

Cooling Equipment Review and Recommendations

Air Flow Balancing and Remediation

Environmental Monitoring LiveImaging™

M&V Government Utility Rebate

Control and PUE Implementation

Energy Baseline

Dynamic Visualization of the Data Center Environment

The LiveImaging™ Software feature provides real-time two-dimensional imaging of the wireless sensor-monitored environment through thermal map color gradients 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.

Preferred Views of Sensors

Sensor views allow sorting by data type. Users can 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. Views can then be placed on dashboards, updated with current data.

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.

Wireless Sensor Mesh Network (WSM)

The SynapSense® Solution is different than other solutions in the market as it uses an advanced Wireless Sensor Mesh Network comprised of robust sensing devices, gateways, routers, server platforms and a comprehensive software platform that spans across all these devices to provide unparalleled visibility, reliability, and resiliency to your data center. The compilation of the SynapSense® Hardware and Software is built upon several key technology components that include:

• Anti-interference features overcome interference in the data center and reliably transmit data over a secure wireless sensor network

• Low power requirement allows the sensors to utilize battery power for years

• SmartSend® Software feature allows users to manage a dynamically changing environment by automatically sending environmental data

• The gateway enables significantly larger wireless networks by allowing the interconnect of up 400 ThermaNode™ Sensors 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

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 result is increased options and adds versatility while decreasing sensor solution costs.

Environment Sensors

ThermaNode™ Sensors are a wireless sensor that measures temperature and humidity from the data center racks, CRAHs/CRACs, plenums, and remaining white space within the data center without the need for wired cable assemblies. These sensors transmit temperature and humidity data via the SynapSense® Gateway to the management software. Operators can install these sensors easily and quickly in most rack configurations. ThermaNode™ Sensors also come with an optional external sensor as an alternative installation method for open frame racks.

Pressure Node™ Sensors measures air pressure differences between two points in the data center (subfloor and room). Battery-operated and wireless, the Pressure Node transmits air pressure data via the SynapSense® Gateway to the management software. Combined with other air pressure data collected, data centers can use this information to increase airflow efficiency.

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

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

Improve Cooling with Thermal Management

During the optimization stage, if efforts show that you need to replace or upgrade your existing physical components, our thermal management solutions offer a full range of cabinet, rack, and cable management systems.

Optimized energy efficiency and capacity is reinforced through improved sealing. Leaks allow hot air recirculation, forcing IT equipment inlet fans to work harder and consume more energy, thus limiting per-cabinet power utilization. Our cabinet systems will help complete containment efforts through in-cabinet ducting and robust sealing solutions that are engineered to improve air separation and provide superior energy savings compared to other vendors' offerings. Even small air leaks within a cabinet will impact data center energy efficiency regardless of the heat load. The following cabinet solutions will help combat these issues:

- **Cool Boot® Raised Floor Air Sealing Grommets** minimize bypass airflow through cutouts in the raised floor

- **Net-Access™ Cabinets and Sealing Accessories** utilize blanking panels to seal space between rack units and prevent bypass air to improve energy efficiency

- **Net-Access™ In-Cabinet Ducting** provides a cool air path to the air intakes on the sides of active cabinet equipment

Additionally, as cabinet power densities rise, the ability to deliver uniform cooling to equipment in high-density PODs is essential to allow full use of available cabinet space and cooling capacity. Use of containment solutions, like the **Net-Contain™ Universal Aisle Containment (UAC)**, will ensure uniform cooling is delivered for optimal performance and savings.

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