

With many organizations pushing to reduce both operating expenses and carbon footprints, data centers face an increasing amount of scrutiny. Data center operators are challenged to ensure "5 9's" of reliability (99.999% uptime), but to meet those goals while consuming less energy.

To that end, one of the best ways to reduce power consumption in an existing data center is to increase the temperature of the facility to the ASHRAE recommended level (80.6°F). But there's more to doing that than just cranking up the room's thermostat.

Here are the six steps you need to follow to safely raise your facility's room temperature:

Step 1: Get Rack-Level Temperature Visibility

In order to raise temperatures, you need real-time access to the rack-level temperatures. Many data centers, especially legacy facilities, only collect temperature data at a handful of locations scattered throughout the room. This presents an issue, because temperatures in a data center can vary dramatically from rack to rack. There are a variety of products on the market today that provide rack-level temperature monitoring using wireless sensors that can be deployed in a live data center.

Step 2: Optimize Airflow

Now that you have a bird's eye view of your data center temperatures, the first thing you'll notice are the hotspots. Hotspots are the result of hot exhaust air mixing with rack inlet air. They are caused by excessive airflow, suboptimal perforated tile or supply diffuser locations, and no hot/cold aisle arrangement.

To eliminate hotspots, walk around and make sure that all IT equipment is aligned properly in a hot aisle/cold aisle layout, and that all of the supply-air outlets are in the cold aisle. If hotspots persist, try systematically turning off or turning down CRAC units in order to relax the airflow, this will reduce mixing. Adjust one unit at a time, and then wait 15 minutes before making another tweak.

If hot spots still persist after reducing excessive airflow by turning off CRACs, you probably have a physical airflow restriction that is causing air from the hot aisle to creep into the cold aisle. Installing blanking panels and optimizing floor tiles should solve most remaining hot spots. Containment can be used as a last resort

to fully enclose the cold or hot aisle.

Step 3: Educate the Organization

With the hotspots addressed, you can now look to get organizational or tenant buy-in on raising the allowable data center temperatures. Your best bet is to focus on engineering analysis like ASHRAE's recommendations.

If there are concerns that increased temperatures will risk data center availability, suggest that an alarm platform that leverages the real-time temperature collection be deployed to continually monitor data center health. The energy savings potential in raising data center temperatures should more than cover the cost of the alarm system.

Here is a table of ASHRAE's 2011 recommended and allowable thermal guidelines. A link to the document can be found below.

ASHRAE Limits	Recommended	Allowable
Temperature	64.4°F – 80.6°F 18°C - 27°C	59°F - 89.6°F 15°C - 32°C
Humidity	41.9°F - 59°F DP 5°C - 15°C DP	20% - 80% RH

2011 ASHRAE Thermal Guidelines: <https://www.ashrae.org/resources--publications/bookstore/datacom-series-thermalguidelines>

Step 4: Adjust the Mechanical Cooling

Now that you are ready to raise temperatures, it is time to look at the mechanical cooling elements. Automated cooling control systems can achieve significant savings by turning off or down cooling equipment as rack inlet temperatures are raised. If you have a chilled water system, additional savings can be achieved by slowly increasing the supply water set point. Most facilities should be able to use a chilled water set point between 50 and 60°F.

For DX systems, raising the rack-inlet temperature in the facility is slightly more

complicated. To do so requires a balanced approach of set point tweaking and airflow adjustments (i.e. turning units on or off). Use automated cooling control systems to set rack inlet limits to your desired temperatures.

Economizer settings may also be adjusted so that more free cooling hours can be captured. The following link is a nice tool from Green Grid that helps quantify the free-cooling savings potential for your facility.

Green Grid Free-Cooling Tool:

http://cooling.thegreengrid.org/namerica/WEB_APP/calc_index.html

Step 5: Identify and Prioritize Further Optimization Projects

During your efforts to raise temperatures, you may uncover physical airflow limitations that prohibit you from reaching your goal of 80.6°F. Blanking panels, perforated tile moves, or containment may be required in a certain area to prevent air from short-cycling back to the CRAC unit, or ductwork modifications might be needed. Use the monitored rack inlet data and thermal maps as a means to identify the true problem areas. Remember that hot aisle/cold aisle layout is the foundation to all airflow improvement projects.

Step 6: Re-Balance the Cooling System

After each airflow optimization project, make sure to rebalance the mechanical system - both the fans and the mechanical cooling. Adjustments made to the airflow will impact the CRAC unit interactions, and this may require adjustments to the fan operations, mechanical set points, or both. Cooling control systems can make cooling system adjustments automatically allowing you to focus on physical infrastructure improvements.

If you want to learn more about how to tackle these issues, contact us at info@vigilent.com and we'd be happy to help. We'll guide you in airflow management techniques, discuss options for monitoring/control solutions, and help you understand the full benefits of raising temperatures in your data center.