Building Managers Cozy Up to Smart HVAC Systems

Daikin Applied integrates Intel® IoT Gateways into HVAC systems to improve building performance and lower operating costs

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Paul Rauker, vice president of Systems and Controls, Daikin Applied

**IoT-Enabled HVAC Systems Trim Expenses**

The costs associated with heating, ventilation, and air conditioning (HVAC) systems make up a large part of building operations. Daikin Applied is using the Internet of Things (IoT) to connect its Rebel® rooftop units to the cloud, capturing valuable data that helps building managers lower energy and maintenance costs.

Intel® IoT Gateways collect information from HVAC sensors and actuators and send it to cloud-based analytics software over 3G cellular networks. Intel® Trend Analytics Software converts data and other information, such as weather forecasts, into actionable insights. Building managers can see information in real time on a simple dashboard they can access on a mobile device or computer.

With predictive maintenance and better energy management, building managers can lower operating costs and keep tenants happier with more comfortable buildings.

**Building Managers Strive to Lower HVAC Costs**

Heating and air conditioning are major expenses for building owners and property managers. To better control these costs and ensure HVAC systems operate more efficiently, managers are turning to building automation systems. These systems can automatically switch equipment on and off at predefined times; monitor environmental conditions and send alerts when measurements exceed thresholds; and provide information on energy consumption, trends, and overall building performance.

According to Navigant Research, the building automation market is quickly expanding, with global revenue expected to reach U.S. $2.4 billion in 2015 and grow to more than $10 billion by 2024. The competitive landscape is also in flux as the next generation of IoT technologies enable new capabilities, such as predictive maintenance, improved visualization and reporting, and proactive energy savings management.

However, traditional building automation systems are complicated and costly. Harnessing the Internet of Things, Daikin Applied has embedded IoT Gateways into its Rebel rooftop systems to help building managers anticipate and respond to their occupants’ presence and preferences in real time, at a fraction of the cost of a building automation system. It’s a solution that puts remote access, trend information, energy monitoring and management, diagnostics, and alarm management within reach for more building managers.
Smart HVAC for Energy and Maintenance Savings

Daikin Applied’s Rebel is already one of the most energy-efficient rooftop units on the market—and the first to meet the U.S. Department of Energy’s Rooftop Unit (RTU) Challenge. The Rebel can save commercial building owners up to 70 percent on HVAC energy costs compared with traditional rooftop units. When Daikin Applied embedded an Intel IoT Gateway into its Rebel rooftop HVAC units, it took energy and cost savings to a new level.

"Many of the advantages that come with an IoT-enabled HVAC benefit both the building manager and the tenant. When the system is working well, everyone saves money—and is more comfortable," said Paul Rauker, vice president of Systems and Controls at Daikin Applied.

Analytics software constantly monitors the equipment’s performance, providing fault detection and even predicting maintenance needs and system adjustments. For example, if a unit has a fan or motor that shows decreasing performance over time, the maintenance crew can inspect and resolve it before the part fails. A dashboard provides maintenance notifications and keeps a running history of all service performed on the unit to help ensure it continues to operate at peak performance. In addition, reporting tools give tenants direct access to their power usage and CO₂ emissions, so they can better understand their carbon footprint.

The system also uses external data, such as weather forecasts, to make adjustments in advance of changing conditions. For example, it may be 75 degrees in Dallas one day, with the forecast predicting 92 degrees the next. Knowing this, the equipment automatically starts cooling the building during the night. This not only keeps everyone comfortable, but also saves tenants money by taking advantage of off-peak electricity rates.

Finally, the HVAC system can be remotely monitored and controlled through any mobile device, speeding issue resolution. Authorized users can adjust set points to address customer needs and resolve operational questions, even when the technician is remote—a feature that can help reduce maintenance costs.

Figure 1. IoT-enabled HVAC systems help reduce energy and maintenance costs.1,2

Figure 2. An intuitive dashboard simplifies the monitoring and control of HVAC systems.
Daikin Applied and Intel® IoT Technology

Inside Daikin Applied’s rooftop units, an Intel® IoT Gateway collects information from HVAC sensors and actuators. The gateway then sends data over 3G cellular networks to an Intel® cloud service that includes Intel Trend Analytics Software. By using mobile networks, HVAC units can communicate directly with the cloud instead of relying on the building’s IT system. This greatly reduces the complexity of deployment and avoids potential network security issues. Managers can receive actionable, real-time data and instantly see proactive shifts in behavior. Users can access an easy-to-read dashboard through a variety of mobile or office devices.

In addition to building gateways into new units, Daikin Applied can also install them into legacy equipment dating as far back as eight years in about two hours. The gateways are managed by Daikin Applied’s analytics software to help building engineers quickly identify HVAC issues and service needs.

Analytics Software

Daikin Applied developed its Intelligent Equipment® platform in collaboration with Intel and Wind River, an Intel subsidiary. Cloud-based Intel Trend Analytics Software provides remote monitoring and decision support for maintenance personnel. The software manages and automatically analyzes operational data to identify problems.

Performance Management Dashboard

An easy-to-use performance dashboard allows building managers to monitor multiple units and buildings for peak operating efficiency and total lifecycle costs. The dashboard summarizes its analysis, communicates alerts, makes recommendations, recognizes HVAC equipment maintenance issues, and validates occupant comfort. It also measures the power and performance of every unit, allowing decision makers to benchmark their equipment and buildings compared to other buildings of similar size and use.

Security

Intel® IoT Gateways run a Wind River embedded operating system that includes fault detection and notification capabilities. The gateway is protected by a McAfee high-level security suite specifically developed to protect critical building systems. Operational data is stored in a secure Intel database.

More Comfort, Lower Costs

At a fraction of the cost, Smart HVAC systems can offer an affordable alternative to a traditional building automation system, with valuable insights into a building’s performance. By taking advantage of IoT technologies from Intel, Daikin Applied offers a revolutionary rooftop HVAC system designed to optimize building performance and lower operations costs. Now, managers can easily see the results of operations data and make a transition from reactive to proactive building management.

Intel® IoT Gateway

Along with providing essential connectivity, the Intel® IoT Gateway acts as a data router and filter between data-generating sources—such as building sensors and intelligent equipment—and the cloud. It enhances data security, accelerates actionable insight, and more importantly, saves money by allowing building managers to securely transfer only data that has operational relevance to the cloud, lowering costs for data transmission and cloud storage.
Learn More about IoT
For more information about Intel IoT technologies, visit intel.com/iot.

To learn more about Intel solutions for smart buildings, visit intel.com/iot/smartbuilding.

For more information about Daikin IoT-based smart HVAC system solutions for building automation, visit daikinapplied.com/solutions-intelligent-equipment.php.