

No Time for Downtime

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BACnet® Exceeds Needs at Mission Critical Data Center

By Jeff Gollnick

Heightedened homeland security, the increasing value of information, and the need to communicate faster and more accurately are driving the creation of mission critical data centers. Once contained in single rooms or floors within existing structures, data centers now require increased security, access, functionality, and capability—far beyond the original purpose or capacity of their host buildings.



Today's data center is not only housed *within* a secure building—it *is* the building. Any company whose business is control of and access to its data must ensure every system in the building—from heating and cooling to lighting and ventilation—runs perfectly at all times in conjunction with its data service systems. For this reason, companies are placing building management systems (BMSs) and control devices onto the enterprise network to simplify control of *all* operations.

Atlanta Data Center

An Atlanta-based identification and credential verification services company recently built its new data center from the ground up to provide mission critical data storage, access, and distribution. While 99.999% high availability—where annual downtime doesn't exceed five minutes per year—may suffice for most companies, the Atlanta company required 100% high availability.

The organization handles massive amounts of information through the identification, retrieval, storage, analysis, and delivery of data. Some of its services include:

- Providing credit check information,
- Tracking the results of DNA testing on death row inmates,
- Conducting high level background checks for government and corporate agencies,
- Creating biometric and authentication services, and

- Maintaining a fax-based alert system that identifies likely communities where a missing/abducted child might be recovered then transmitting data and photos of the child to get a search underway.

Because the BMS needs to perform to the same standards as the data systems, BACnet was used to integrate and coordinate all of the building systems onto a single network.

Mission Critical Systems

The non-negotiable 24/7/365 operation of the data center requires a specialized infrastructure to handle its mission critical nature. Because redundancy is the key to 100% uptime, the BMS contractor used BACnet technology to create a solution that met the needs of the mechanical, electrical, HVAC, and data systems to achieve it.

Power

The data center has 4160 vac emergency generators in case main power ever fails. The generators feature two 20,000 gallon fuel tanks and four day tanks, allowing the center to operate for 50 hours without main power. The company installed power distribution units (PDUs) that clean and distribute the power from an uninterruptible power supply. The PDUs can page data center staff if any alarm is activated within the BACnet BMS. The BMS contractor monitors the PDUs and the static transfer switch issues, which transfer one feed to another



Screenshot of generators.

in the event of a power surge or outage, so that none of the mission critical computers ever go down.

Water

The company's own water well supplies its mechanical systems. The well is the primary source for the data center's makeup water, with the City of Atlanta's water well serving as backup. Conversely, if the city's water supply is disrupted, the well serves as a source for potable water.

Tying in HVAC

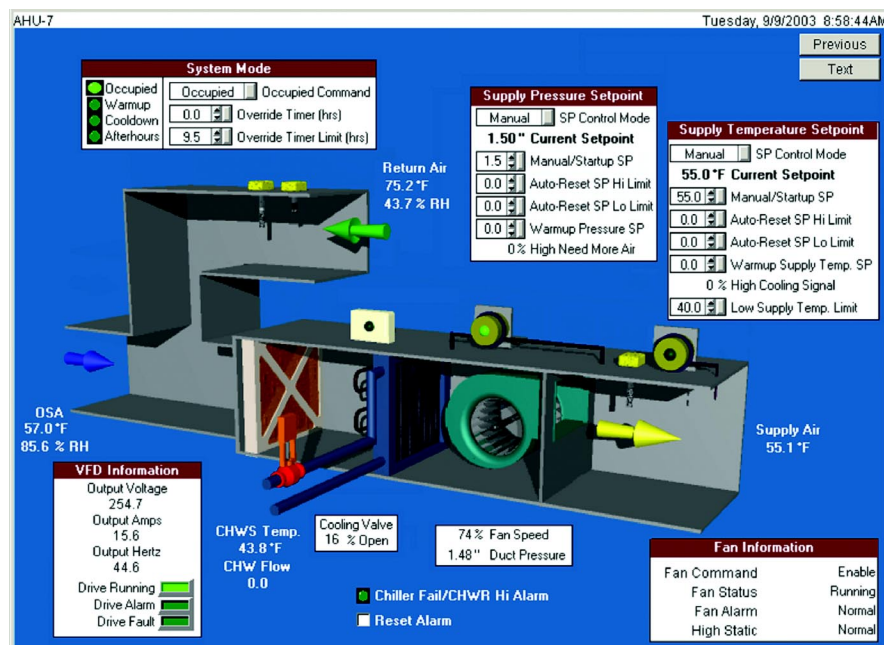
Every device running the data center—from the building's standard HVAC operations to the chillers, generators, utilities, incoming power, breakers, and fuel oil—had to be integrated with the BMS. The center's HVAC system runs on a native BACnet/IP BMS operating on the building's Ethernet local area network.

System Components

The BMS contractor installed three global controllers to manage the 15 established zones in the building. An MS/TP network connects the global controllers to nearly 300 field level controllers that oversee all HVAC devices, including main air-handling units, cooling towers, variable air volume terminals, fan coil terminals, and exhaust fans.

For secondary control of the variable frequency drive (VFD), which controls the average of hot and cold duct static pressures, the contractor installed MODBUS communication wires directly to the drive so the BMS could retrieve data from the VFD.

BACnet extends redundancy capabili-



Screenshot of HVAC control shows an air-handling unit.

ties to the HVAC system's cooling protocols. The center hosts one stand-alone chiller plant with two expandable controllers that act as redundant panels. If one panel fails, the other carries the load and no change is noticed when the switch occurs. The BMS monitors all chiller data and operating information.

BACnet/Software Features

BACnet supplies the interface between the company's building controls and its engine and compressor controls by tying many MODBUS points to 12-cylinder diesel-fueled engines. This way engineers can see real-time data from each engine, including voltage and current for the entire building.

Using BACnet, the BMS transmits the status of each breaker position from 54 third-party vendor distribution boards throughout the data center.

The BMS tracks the company and other building tenants' main power usage to accurately capture and bill energy costs. The additional monitoring capabilities of the BMS allows tracking and justifying the electrical and mechanical costs of running their businesses.

BACnet operator workstations allow the data center's facility manager to view, monitor, and adjust all system functions,

including time schedules, trend logs, alarms, and alarm histories. Vivid, animated 3-D graphics display zones down to the deepest levels, allowing complete and detailed views of every zone and mechanical device. Operators can also create global control strategies or modify existing control algorithms for any controller using graphical DDC logic programming software, then quickly download the program to individual controllers on the network.

BACnet, BMS and the Future

The BACnet BMS within the data center is the latest example of how companies are protecting their mission critical data within mission critical buildings. New BMS technologies are beginning to converge with existing enterprise systems for exponentially increased benefits to building owners and property managers. By providing interoperability between disparate equipment, the BACnet protocol standard leverages a company's total technology investment for better system performance and a greater return on investment. Already accepted industry-wide, BACnet is proving to be a long-term solution to building management issues.

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