

BACnet

International



JOURNAL

Issue **09**

This Issue

Where BACnet and Building Automation
Has Been and Where It Is Going

BACnet Global Roadshow

Chicago, IL – April 14th

Seattle, WA – April 21th

"The first summer of operation with
BACnet was the smoothest summer
ever in terms of customer satisfaction."

Ted Ruswick
Loyola University, Chicago



Global Testing of the Global Standard



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3 “Secrets” to BACnet's Success



Dear reader,

This issue of the BACnet International Journal is dedicated to a simple but important fact: BACnet has stood the test of time! For 20 years BACnet has been recognized as an ANSI/ASHRAE standard in the United States and for 10 years as a DIN/EN ISO standard in most of the rest of the world. Given the relatively short time that most technologies survive, particularly data communication technologies, this is a truly remarkable achievement!

Looking back, there are at least 3 “secrets” to BACnet's success.

First, the standard was designed from the beginning to be extensible. We knew technology would change for the better and we wanted to do our best to make sure BACnet would always be positioned to make use of the “latest and greatest” technologies available.

Second, we have been incredibly fortunate to have some of the best people in the industry working on BACnet's maintenance, improvement, and promotion. As a result, unlike some protocols, BACnet is constantly adjusting to the new realities of the data communication and building automation worlds – with great benefit to developers, implementers, and users.

Third, our committee work has always been inclusive. We have always welcomed ideas from anyone with a genuine interest in improving the standard. A BACnet committee meeting typically has participants from around the world including Europe, Asia, and North America.

Given its rich and successful history, there is every reason to expect that BACnet will continue to flourish and that publications such as the BACnet Europe Journal will continue to play an important role in providing our industry with significant and up-to-date information on BACnet's use and ongoing development! ■

H. Michael Newman,
Original Chairman of the BACnet Committee 1987 – 2000

CONGRATULATIONS BACnet

ASHRAE is excited to celebrate the 20th anniversary ANSI/ASHRAE Standard 135, BACnet – A Data Communication Protocol for Building Automation and Control Networks. ASHRAE remains committed to BACnet given that our industry depends on interoperability that allows use of equipment from multiple suppliers in a single building automation and control system. ■

Sincerely,

Thomas H. Phoenix, P.E.,
ASHRAE Fellow
ASHRAE-Certified Building Energy
Assessment and Building Energy
Modeling Professional
2014-15 ASHRAE President



“BACnet is an excellent organization that is defined by the high quality of its educational programs, interoperability testing and promotional activities. CABA is proud to be a reciprocal member of BACnet and is happy to celebrate 20 years of BACnet as an ANSI/ASHRAE standard.” ■

Sincerely,

Ronald J. Zimmer
President & CEO,
Continental Automated Buildings Association
(CABA)



In 2015, BACnet International and the ASHRAE celebrate 20 years of BACnet as the ANSI/ASHRAE Standard 135. We are happy to look back on the successful development of this global standard. The BIG-EU would like to congratulate you and all the BACnet pioneers in North America for this unprecedented technology leadership in building automation. ■

Sincerely,

Volker Röhl,
President of the BIG-EU



A New Era of Energy Efficiency

BACnet protocol allows HVAC control, lighting control, access control, fire detection systems, and other associated equipment to all speak the same language.

Products and services for building automation systems that save energy are entering a new era as the technology evolves in performance and sophistication. But with so many offerings, the age-old problem of compatibility and integration can short circuit savings and efficiency gains. Yet, there is a solution that all building and facility managers should be aware of. It's called BACnet, a data communication protocol for building automation and control networks. Essentially, we're talking about software code, so what does that mean to the choice and use of building automation systems and related products? Well, about 75 words on BACnet's history should lay the groundwork, and then we'll talk to some industry experts to see how you can benefit from this standard and why it's so important to maximizing energy savings and efficiency.

BACnet is an American national standard, a European standard, a national standard in more than 30 countries, and an ISO global standard. Developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), the protocol is supported and maintained by ASHRAE, and supported by BACnet International, an organization that encourages the use of BACnet in building automation and control systems (BAS) through interoperability testing, educational programs, and promotional activities.

BACnet International gained more than 15 new corporate members in 2013, and according to the organization's president, Andy McMillan, the momentum continues to grow because there's a surge of automation systems and peripherals hitting the marketplace.

"Building owners, operators, and facility managers want to see all the devices coming into the system on a standard communications network," says McMillan. "In the earlier days, the focus was on companies that built control systems for building automation, but now we're seeing an expansion of the companies that make devices for these control systems."

Accommodating the wide variety of automation devices is advantageous for BAS providers, according to Ben H. Dorsey III, Sr. VP of marketing, LEED Green Associate KMC Controls, New Paris, IN. "BACnet has emerged as the predominant communication protocol among all the manufacturers of automation systems, and that has tremendous benefits for building owners and facility professionals," says Dorsey. "It's an open interoperable standard, so if you install devices from different manufacturers that work with BACnet, they can all communicate with one another and are visible under a user interface. Now building owners can have any number of manufacturers or contractors and service providers."

Interoperability allows BAS to move beyond simple standalone operations such as controlling equipment with routines that turn things on and off. "When we start to connect those devices together we enter the realm of automation," explains Dorsey. "By automating an entire system such as the HVAC we gain certain efficiencies in energy and operational costs. The next level is integration of systems where you're taking those automated systems and integrating them with a lighting system, or security, or a life safety system. And the last level is data analytics and data information that can be added to an automated and integrated system to show a building owner this valuable data for analysis."

The value of that data can be impressive. In the case of Headway Technologies, a TDK subsidiary located in Silicon Valley, CA, senior facility manager, Dan Burris, reports that working with KMC Controls' systems resulted in a direct cost savings that topped \$800,000 per year, and achieved a return on investment (ROI) in 10 months. The project focused primarily on the facility's air handling units, composed of 20 standard and 52 recirculating units that supply and recirculate air at the disk drive manufacturing plant. A secondary issue concerned water usage and conditioning for chilled water, hot water, and steam, needed for domestic and production purposes. These issues

were addressed with variable frequency drives for appropriate motors and valve changes for higher control levels. All told, electricity usage dropped more than 10 %, from a continuous demand of 5.4 MW to 4.7 MW.

Reducing electricity usage more than 10 % garnered the attention of Pacific Gas & Electric, and the utility awarded Headway's efforts with a rebate check that exceeded \$633,000. It was noted as the largest of such rebates given within Silicon Valley to date.

Many utilities are offering incentives to encourage energy efficiency, but they're also imposing financial penalties to discourage consumption, and this can be critical to the economics of businesses, especially those that need high megawatts, such as data centers that typically require electricity of 10 MW and higher (some exceed 100 MW). According to Mike DeNamur, former vice president of sales and marketing, Automated Logic Corp., Kennesaw, GA, and current VP of Sales and Marketing at AdvanTE3C, a newly formed sister company of Automated Logic, "The dynamics of energy have grown from 10 or 20 years ago. So the decisions are much more complex and the opportunities are greater, but so are the penalties. You can influence your energy consumption to drive revenues or protect yourself from some of the more oppressive utility rate structures and challenges. But if you don't understand it and don't prepare, the penalties can be very large."

To manage consumption, Automated Logic offers a powerful front-end building control software product with a graphical user interface and features that include hierarchical scheduling, thermographic color floor plans, trending, alarm management, and reporting. For detailed reporting, the company's EnergyReports product enables facility managers to produce a wide array of reports showing a building's energy consumption. Users can compare energy consumption or demand over different periods with simple drop-down menus and calendar control options.

The new High-Performance Computing Research Center (HPCRC) at Princeton University installed Automated Logic's WebCTRL Building Automation System to manage energy consumption. The facility is one of only nine high-performance data centers in the world to achieve US Green Building Council Leadership in Energy and Environmental Design (LEED) Gold certification. The 47,000 square-foot facility is home to Princeton's Terascale Infrastructure for Groundbreaking Research in Science and Engineering, and contains nearly 1,800 computers.

The centralized computing facility features sophisticated heating, ventilation and air conditioning technology, monitored and controlled by ALC's WebCTRL system. Three chillers maintain water temperature at approximately 45 °F to air-cool the computers, which generate excessive heat; the system can switch to outside air during colder months. A natural gas-driven generator, switched on when electricity prices spike, features a cogeneration function that captures expelled heat as a source of energy to chill water. The WebCTRL system provides multiple levels of redundant (N+1) control, backed by extensive trend reporting capabilities.

"You could imagine a scenario where it's the middle of August and extremely hot, and therefore the electric grid is taxed and there is limited generation capacity, so prices are very high to motivate people to use less energy," says DeNamur.



Credit: Distech Controls

Users can quickly view, edit, and configure HVAC and other systems.

"What if you could choose not to use energy during those times, and instead pre-cool the building in the morning so it uses less energy in the afternoon, or deploy thermal storage? Temperature control and environmental control is one thing, but is just the tip of the iceberg. You can think about a building as being a place to conduct business, but it's also a strategic asset that needs to be managed to drive revenues, and reduce costs. But you can't just put it out there and let the building run in the same operating mode 24/7."

As building owners seek to gain full control of their energy consumption, the requirements for operating in a dynamic mode have challenged BAS manufacturers and the daily management tasks of

their customers, but new solutions are easing the burden. For example, Distech Controls, Brossard, QC, offers its BACnet certified, Integrated Room Control (IRC) Solution for the control of HVAC room terminal equipment, lighting, and shades. It's a modular solution designed for easy configuration to define operating cost savings for local or room applications, such as offices, patient rooms, dorms, military housing, and more.

For facility managers, Distech recently upgraded its ECB and ECL 50 Series BACnet controllers with integrated LCD operator interfaces. Interface design has a significant impact on ease of use, and the 50 Series controllers provide users with the ability to quickly view, edit, and configure an HVAC system's operating parameters, while color-coded icons and highlights provide at-a-glance indication of alarms and override conditions. The display serves as a local HMI, facilitating system troubleshooting and diagnostics without the need for a laptop, offering maximum convenience and efficiency.

"These controllers are extremely handy," says Caroline Cadieux, marketing and communications director at Distech. "This controller typically would be installed in a mechanical room to control terminal unit equipment or central plant equipment so most of the time it can be a panel mounted board attached directly to the terminal equipment itself. That makes the LCD even more practical because you have a local HMI regardless of where you are in the building. So, rather than having to unplug your laptop and go down to the mechanical room trying to find an Internet connection, you have access to all the functions of the actual controller."

The functions allow quick access to operating parameters, and Cadieux notes that because the controllers are fully programmable, they're not limited to HVAC. "It could be lighting, temperature, humidity, CO₂, or anything you want to control. Today, more people are looking to get a fully integrated building automation or unified building automation system, because that's how you get the most out of your automation – when you can actually make sure your lighting and HVAC and comfort parameters are responding from one central control system." Controls and systems such as Distech's will be handling many new specialized components and the BACnet protocol has accelerated the introduction of these new products, according to BACnet's McMillan. "There are people and companies that can now enter the market without having to supply complete systems and they can use BACnet as the interface and connect to the other systems. It's very much like the days of the PC where now you can just make a printer and be OK."



Credit: Aircuity

Intelligent measurement solutions offer real-time sensing and continuous analysis.

With HVAC typically accounting for about 30% of a building's energy consumption, many companies such as Aircuity, Newton, MA, are focusing on airside efficiency. The company provides building owners with sustained energy savings through intelligent measurement solutions that combine real-time sensing and continuous analysis of indoor environments.

Recently, Aircuity was awarded an energy retrofit contract to provide its laboratory ventilation optimization solution for the Lazare Medical Research Facility on the University of Massachusetts Medical School campus in Worcester, MA. The project is expected to significantly lower the energy usage throughout the facility while maintaining a comfortable and productive workspace by continually monitoring the building's indoor environmental quality.

The Lazare energy project will involve the installation of Aircuity in the lab areas on all floors of the facility, to provide smart signals to the facility's building management system to adjust the ventilation rates according to the actual conditions of the space. The data collected is then analyzed to provide actionable information to facility and energy managers on overall building performance, and to give environmental health and safety personnel better insight to lab operations.

The next big thing in energy efficiency is airside control, according to Aircuity's vice-president of marketing, Chuck McKinney. "An airside energy project is not as simple as calculating a retrofit for lighting, but you get really significant results," says McKinney. "And the more sophisticated self-sufficient customers can use our energy simulation tools that are written to compare different energy-saving approaches. So a commercial office building could use these energy tools to compare doing main control ventilation with Aircuity solutions versus doing nothing, or compare our controls to discrete CO₂ sensing, or mix and match. We use BACnet, because we gather information and partner with building automation systems, and you want them to work well. It's typically less than two years for a return on investment in lab environments. At Beth Israel, they renovated six floors and cut their utility bill about \$640,000, and paid for their system in six months."

Such fast returns make a persuasive argument, but calculating ROI and savings requires accurate energy audits, and according to Cynthia A. Boyd, director of sales, Continental Control Systems, Boulder, CO, certifications must be met if “revenue grade” data is needed for utilities or regulatory agencies. Continental recently announced that its WattNode Electric Power Meters now offer ANSI C12.1 accuracy, and support Modbus, BACnet, or LonTalk communications protocols or pulse output.



Credit: Continental Control Systems

“The WattNode is a submeter, rather than the utility meter, and if you have energy production or sell energy that you might be producing from an alternative source like solar or wind, you have to have a certified or compliant high accuracy meter in order to verify your readings,” says Boyd. “In other cases, there are states that require accurate monitoring where you are connecting with BACnet to a building automation system and monitoring other tenants or spaces within the building, allocating costs to them for their energy usage.”

The WattNode BACnet meter, supports full self-discovery of the meter and all of its objects, plus more than 50 electric power-related measurements. According to Nathaniel Crutcher, director of engineering and a founder of Continental Control Systems, energy is obviously the number one measurement, but there are several variations, such as net energy; for those businesses consuming and generating in a situation such as having on site solar panels, it [the meter] can count up and down.



Credit: Lutron

Automated window shades are coordinated with lighting controls.

“We also provide energy measurements on a per-phase basis because most buildings use three phase power and you can look at those independently, or look at the sum of all three phases,” says Crutcher. “Next on the list would be power because energy is your accumulated total, whereas power is what you’re using at a particular moment, sort of like the speedometer on a car, and that’s very useful if you want to avoid hitting a demand peak because it lets you know on a minute-by-minute

basis what’s happening. People also use it [the meter] to monitor voltage and current, or the power factor, which is important to bigger energy customers because they are billed on the power factor of their load. And, we have a demand measurement, which lets you essentially track and see if your measurements match what the utility is reporting.”

With so much data available from meters and other devices such as lighting and HVAC controls, the opportunity for data analytics is growing, says Brent Protzman, a lead architectural engineer in Energy Solutions at Lutron Electronics, Coopersburg, PA. “We’re talking about the collection of data as intelligence, but there’s so much data and a lot more that needs to be done in managing it optimally for the long-term,” he explains. “At Lutron we’ve been collecting lighting controls data for years, but until now building managers generally weren’t that interested in seeing this data, in part because there wasn’t the ability to see multiple systems simultaneously without being overwhelmed by the information.”

When managers can see the data in a comprehensible format, the efficiency gains are impressive. “In the lighting world we have automated window shades that can let light in which reduces the power needed for lighting,” says Protzman, “and with the right intelligence, instead of separately optimizing HVAC at the plant and separately optimizing the lighting with daylight harvesting and personal control, it should be done all together.”

Along the lines of BACnet and interoperability, Protzman notes that it’s important to consider ongoing performance and how the systems integrate to each other, along with the fact that these are not static technologies.

“Lighting is usually considered as secondary to the HVAC system in terms of advanced technology,” he says, “but now we’re understanding that by bringing the other systems into an overall encompassing energy and operational management system, we’re going to start to see some useful, intelligent buildings as we move forward. However, things are always changing and the technology must be designed to be easy to use, because the turnover in facility management is very high. The new management comes in and doesn’t know what to do, because certain systems have been disabled or sensors aren’t working.”



Ed Ritchie

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The advances in LED lighting technology will contribute to both energy efficiency and simplified BAS controls, according to Scott Roos, Vice President of Product Design for Juno Lighting Group, Des Plaines, IL. “This technology has just scratched the surface in terms of its evolution,” says Roos. “We went through a phase where there were very large gains in the efficiency of the LED light source and also in terms of the quality of light, and in general, we see that the LED source is getting more efficient and the light-emitting surface of the source is getting, in some cases, smaller. The smaller the light-emitting surface, the better opportunity to precisely control and distribute the light what you want.” Roos notes that controls are advancing to a new field of lighting that’s called “human centric lighting.”

“If you go back to 2002, there was a whole new set of photoreceptors discovered in the eye that we didn’t know about before,” he says. “These have nothing to do with vision and everything to do with regulating our circadian system in our body, and this is based on how lighting makes us feel rather than just how it looks. So far, there’s been enough research to start documenting certain things like exposure to bluish lighting at night and how that can negatively impact your sleep cycle. Also, [there are] links to cancer and breast cancer for shift workers, such as nurses working the night shift. Then [there is] depression of the immune system, anxiety, and all sorts of problems that we’re just beginning to understand. So the ability to have a light fixture that can control the light and change during different times of day will impact our health and well-being.”

With benefits to health and well-being, plus energy savings and efficiency, the BAS industry looks poised to make a substantial impact beyond the simple task of reducing energy consumption. And the role of the BACnet standard is obvious to BACnet’s McMillan. “It speaks to a larger issue, which is the growing importance of information and information infrastructure in the building automation world,” says McMillan. “In the past, building automation was about control, and information was a side issue. But now it’s migrating rapidly to the point where building automation is about information and control is a necessary tool of that process.”

Article originally published in *Business Energy*, May 2014



Standard Data Protocol For Building Automation – A Mixed Blessing

Standards are documents that are created by experts in a process of mutual agreement on standardization bodies. These documents are particularly well suited for disseminating technical knowledge in today's communications environment. Unlike patents, which are subject to intellectual property rights, the knowledge codified in standards is available to everyone at no charge. Standards define terminologies and design principles and processes, upon which an industry may rely. With standardization comes a level of certainty as to planning, costs and legal issues; in the case of building automation, for all those involved in construction.

Standards and Operating Policies

In many countries standards must be agreed to contractually. A European Standard (EN) is implemented in all European countries as a National Standard. Sometimes standards are regarded, however, as more of a burden – providing no added value and as a form of state intervention – but only by those who wish to bypass a “generally recognized state of the art” for business reasons, or that have no idea of the scientifically proven economic impact.

Hardware Costs as a Backdrop

The old industry standard fair practice of intensive sales support for consultants with proprietary, often encrypted bills was intended to confuse competitors. The common hardware data point calculation does not distinguish functionally between the data point for a bathroom fan or that of a complex chiller, even if it is used to simply indicate the function on a plant schematic, a cascade control system or a complex control chain for a cogeneration plant. This situation resulted in a fatal downward price spiral. In other words, the one who miscalculated the most, got the job – and improved on it by “omit”. This is exactly where for some of these players the “curse” of standards begins, because it becomes just that more difficult to pull the wool over the eyes of enlightened customers.

Concerted Action

The most important prerequisite for an efficient building automation and control system (BACS) is a competent design and tender as well as clear

and unambiguous documentation of project requirements. Technical processing (engineering) is a key project cost driver since the advent of digital technology. These expenses are directly related to the required building services functions.

Builders, consulting engineers, BACS manufacturers and HVAC companies have to agree in a concerted campaign on a definition of one BAC language (BACnet) and of BAC functions (ISO 16484-3) and introduce them as a rule of technology and in standard specification for BACS. In ISO it was intended from the outset to standardize the processes for design and implementation in addition to hardware and data communications. In Part 1 of the global BACS standard, the Part 3 “BACS-Function List” (BACS-FL) is defined as documentation of the planning concept for system neutral BACS-planning. For a energy efficiency certificate, these functions also are required pursuant to ISO 16484-7 [energy efficiency by BACS].

BACnet and the BACS Function List (BACS-FL) as One Worldwide Standard

Today the BACS industry needs to achieve testable project quality as well as cost accounting and cost certainty when it comes to the building automation and system integration trade. The BACS-World Standard series EN ISO 16484 is available as a code of practice. The BACS-Function List and its functions definition has gained acceptance throughout Europe (EN). This BACS-FL is the collection and allocation of standard BACS functions ranging from data points to plants and/or suppliers. It replaces the mostly incomplete prosaic descriptions of functions, which can be interpreted in any number of ways.

Predictable Services

In contract documents (bill of quantities) each of these BACS functions is calculated as a complete engineering service – from technical clarification,



Fig: The ISO/TC 205 WG3 “BACnet” Team in 2011

programming and commissioning to operator instructions and documentation. This simplifies settling accounts for increases or decreases to a project. In the bill of quantities, the BACS hardware can be advertised as product neutral per mechanical equipment room by the number of required I/Os. The allocation of services (functions) to subsystems in integration projects is nearly impossible without the BACS-FL. Today, there is virtually no BACS project that does not feature interoperable communication/integration of third-party products, e.g. boilers or SCADA. The most sustainable and cost-effective solution for these tasks is using the internationally standardized communication protocol BACnet (EN ISO 16484-5); manufacturers can no longer afford to not offer this standard protocol without consequences (who could see that as a curse of standardization?).

Expertise and Potential for Innovation

Clean and proper calculations under the BACS-world standard, helps keep innovation potential within the industry and protects it from undue legal expenses. In addition, a lack of expertise (curse?) is quickly evident when applying a standardized protocol and functions in a tender. To remedy this, there are courses on BACnet and standardized planning and tendering of building automation [1], [2].

Finally, the legal certainty of standardization permits investments in rationalization tools (C-Tools and e-commerce) for planning, tendering and engineering clearing the way for an unprecedented streamlining of planning and sales processes. And in the end, the building operator receives a system that works as advertised and planned. ■

[1] BACnet Academy <http://www.bacnetacademy.org>

[2] VDI Wissensforum <http://www.vdi-wissensforum.de>



Hans R. Kranz

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Drupal – A (BAC)net Gain

Twenty years ago, engineers dreamed about control systems from different control companies that could work together. There was no alternative to standalone control systems. Exasperated HVAC engineers routinely left the control system design to the control companies.

Then those unfulfilled dreams became reality as a new wave of technology enabled engineers to successfully design and specify not only control systems but interoperability requirements for building automation systems as well. Since its introduction in the 1990s, the open protocol for building automation communications, called BACnet (Building Automation Control Network) has become a driving force in building system integration today. The October 18, 1999 issue of Engineering News-Record magazine listed BACnet among the top 125 innovations in the last 125 years. I wouldn't be surprised to see it in the top 25 if ranked today.

BACnet is now an American national standard, a European standard, a national standard in more than 30 countries, and an ISO global standard. Smaller control companies that championed the development of the standard by bringing the first BACnet products to market have since been bought and merged into large corporate infrastructures. Engineers have more tools available today to assist in designing, specifying and actually using control systems than ever before. They are now better than ever able to deliver robust control system designs that add fundamental value to facilities.

Large numbers of companies have also registered for BACnet vendor IDs. At the time of this writing 791 Vendor IDs have been awarded to established companies and startup alike. Once characterized as a fad by many in the industry, BACnet control systems are now being specified and installed on large numbers – if not most – of new building projects across the globe. Automatic control systems are being used more effectively and in greater abundance on projects at lower costs and longer lasting value than ever before.

The Drive for Industry Dominance

Ira Goldschmidt, P.E., LEED-AP, Owner of Goldschmidt Engineering Solutions with 30 years experience providing “Intelligent Building” technolo-

gies has witnessed the development of “open” building automation systems. In a January 2000 article he summarized BACnet development up to that time like this, “As an ANSI standards body, ASHRAE is bound by the rules of public review and comment. From the time of BACnet's first published draft, it took four years, three public reviews, and the individual resolution of 741 comments to gain approval of formal publication of the standard in 1995. This process helped make BACnet stronger than any proprietary protocol could ever hope for, but delayed its release to the point where it could have died on the vine.”

Gerry Hull, past-president of Automated Logic Corporation (ALC) said “when we first took a look at incorporating BACnet into our control systems, we asked ourselves two fundamental questions. One, does it have ‘legs’ (meaning, will it be around for a while), and does it have fundamental value?” Accurately assessing these two fundamental issues early on led ALC to develop BACnet products and establish themselves as leaders in the BACnet movement.

The completion of the 1995 BACnet standard paved the way for interoperability between building automation systems. Manufacturers using the BACnet standard in their products started as a trickle in 1995 and today dominate the building automation market place. Mike Newman, past chairman of the ASHRAE committee overseeing the BACnet standard during its early formidable development stages said, “The ultimate success of BACnet depends on users specifying BACnet products and manufacturers delivering them.”

The Birth of the BACnet Group-Drupal

The driving rationale for BACnet has always focused on open protocol and system interoperability. To the “manufacturers” this meant being able to sell products in established facilities even where they had no immediate presence. To the “user” this meant being able to interact with their control systems and its data using their own staff to improve facility operations. As control systems ‘opened up’ with BACnet, interest groups formed across the globe to disseminate ‘unbiased’ information on BACnet control systems increased. Among the first such interest groups, BIG-NA formed “To facilitate the open exchange of user ideas and experiences as the complete interoperability of building systems is achieved.” After six years of existence, during which time the goal

of converting the building automation industry from a “manufacturer-driven” to a “user-driven” industry was largely accomplished, the members of BIG-NA decided to join forces with the BACnet Manufacturers Association to create BACnet International, today a shining a focal point of the BACnet Community.

The term “user” in the BACnet community from a functional perspective has been used to reference facility engineers and personnel involved in project design, construction, commissioning and operation of facilities. Indeed, most facility personnel cringe at the thought of allowing building “occupants” to access their BACnet based energy management systems. As a result much of the data collected by the million dollar investments of larger facilities into their interoperable web accessible control system remains accessible to only a select few. Different types of energy dashboards began to appear several years ago to address this issue by making some of the BACnet data available to everybody, even those who did not occupy the building. This kind of access was made easier with the introduction of BACnet Web Services, but not all BACnet systems deploy web services as a feature in their product. As a result, the new data hungry dashboard market began to deploy their own means to capture data and sell their services, while established BACnet vendors began to develop their own products to meet the new demand for slick energy dashboard displays.

Energy Dashboards combine smart metering and Internet technologies to provide real-time data on energy use. Their success is based on the premise that real-time feedback drives behavior change and improves operational efficiency. Energy Dashboards are used to enable energy reduction competitions, showcase real-time building performance and green building features, and empower occupants to become active participants in energy management. Sustainability teams from major corporations, governments, universities and K-12 public schools use energy dashboards as an effective communication tool that creates transparency. In many ways, energy dashboards today have become what BACnet users were trying to avoid at the onset, namely some kind of proprietary lock on accessing their building automation systems.

Different open source communities have developed in response to proprietary market forces. BACnet has its own for instance which gives

users unfettered access to actual software code, and for the most part is available for free or for a trivial cost. The sacrificial investment of time by dedicated programmers in the BACnet community has resulted in a substantial library of BACnet code available for free download from such on-line repositories as "Sourceforge". Quality open source software of many types is available for free download on the Internet today and on-line communities of users to use and support the software are prominent on-line.

One popular genre of open source software is known as a content management system. A content management system (CMS) is a computer application that allows publishing, editing and modifying content, organizing, deleting as well as maintenance from a central interface generally access by internet web browsers. Such systems of content management provide procedures to manage workflow in a collaborative environment. Drupal is one such CMS.

Drupal is a free open source content management platform powering millions of websites including WhiteHouse.gov and Energy.gov. It's built, used, and supported by an active and diverse community of people around the world. For instance, on September 15, 2014 it was announced the Australian Government standardized on Drupal for its digital government platform. With Drupal, users "Come for the software, stay for the community". The BACnet Group – Drupal has recently formed as a resource for both the BACnet and Drupal communities. They have successfully developed and field-tested a BACnet module for Drupal. The module embeds dynamic energy data as energy dashboard type features in Drupal based websites thru a user-friendly interface. The features include "real time" displays of dynamic text, dials, graphs and charts.

The objective of BG-Drupal is to educate and train both the Drupal and BACnet communities on use of the module through a demonstration website, training workshops, seminars and energy competitions. BG-Drupal is also the force behind the OpenEnergy project for Drupal. OpenEnergy is planned as a free one-click install for self-hosting energy competitions and more.

On September 30, 1998, ten colleges and universities plus several engineering consultants were represented at a BACnet symposium hosted by the University of Cincinnati. "It was like walking out of Independence Hall this morning!" declared Mike Newman as he began his presentation in the General Session. "Independence Hall" referred to a breakfast meeting with some of the delegates where the first plans for a BAC-

net interest group were summarized. The entire symposium started out as an educational session, but it now appears that its most lasting impact will be the genesis of the interest group to support and promote the use of BACnet building control technology.

The BG-Drupal Community picks up on this bit of history borrowing from Lincoln's iconic phrase in the Gettysburg Address "government of the people, by the people, for the people, shall not perish from the earth." BG-Drupal certainly views the government, as a major adopter of both Drupal and BACnet, as both a member and benefactor of this technological community. But "the people" of the BG-Drupal Community, with its focus on energy savings, extends the BACnet user concept not only to all building occupants but to really to all Internet users. It does this by bringing the energy and environmental data from BACnet systems, directly to the sites facility users access the most.

OpenEnergy: Using the Force of BACnet in Module for Drupal

In less than a year since its release, BG-Drupal has launched a bold new project named OpenEnergy. This project which is building a dedicated Drupal distribution for energy management, is easily justified. It extends the bounds already established by such Federal initiatives as "The Energy Data Initiative", the "Roadmap for a Digital Government", and President Obamas Executive Order Focused on Federal Leadership in Environmental, Energy, and Economic Performance.

OpenEnergy will be the quickest way to get Drupal energy dashboards up and running. It will include the latest versions of Drupal core, the BACnet module for Drupal, a LON module for Drupal, and many other modules for a rich mobile ready user experience. It will also furnish a set of options to create a fully-featured energy dashboard demo out of the box complete with an attractive theme, sample data for blocks, dials, charts and graphs and search configuration, and a custom energy management/environmental systems interface that can be applied across multiple facilities with multiple types of building automation and control networks.

Who should use OpenEnergy? Anyone who wants to skip weeks of configuration to build:

- An energy dashboard site for energy competitions.
- An energy management dashboard that gives you one click access to ALL your building automation systems regardless of protocol.

- An environmental monitoring dashboard of your assets which are spread across facilities, regional boundaries, vendors, and service networks.
- Or ... any combination of these features with in-depth analysis and reporting on Big Data for making environmental improvements and harnessing energy-efficiency savings.

OpenEnergy seeks community input thru several established channels at this point. The demonstration site for the BACnet module for Drupal and home of the BACnet Group – Drupal also serves as the testing platform for the OpenEnergy Drupal distribution. Additionally the BACnet project on Drupal and the OpenEnergy Drupal distribution both have issue queues where the BACnet-Drupal user communities can read in great detail how the code has developed to this point, and well as impact its development moving forward. The Drupal community uses the issue queue to work as a team. If you need help with a specific project, whether a module or a theme, you should go to the issue queue where the maintainers, active users and fans of the module or theme will be communicating for that specific project which makes it more likely that your question will be seen by people who can help you. Additionally participation in the BACnet-Drupal community can happen at the Drupal Groups website for BACnet.

The OpenEnergy base installation at www.bg-drupal.org consists of real demonstrations of BACnet systems. The secret behind it is really no secret at all. It is simply a real-time open source demonstration of BACnet Web Services. It presently implements BACnet WS as both v.1 and v.2. B-WS1 is presently deployed as a feature in a number of BACnet Advanced Operator Workstations. One of the cool things however is that working prototype for B-WS2 is already implemented and on display at Open4Energy. "Open4Energy is an open source provider of knowledge to consumers and small businesses on energy saving and renewable energy generation." They have a particular focus on the role of emerging technologies to facilitate energy saving, independence from fossil fuel, and practical contributions to the threat of climate change. When B-WS2 completes its final public reviews and becomes part of the BACnet standard, this Drupal Community will quickly adapt its early code base to securely communicate with the newest BACnet products.

To HVAC and Beyond...

Regis Cleary, P.E., now a Mechanical Engineer at Penn State University and among the original Board of Director for BIG-NA 15 years ago said back then if you want to know BACnet's future, look at its past.

"If you want to know the future, look at the past. In the early 1980s, Apple Computer had a clear technical lead in personal computers, and IBM, while not a technical leader in PCs, had even greater name recognition. However, Apple and IBM lost their lofty market positions to PC clone makers because an operating system (both software and hardware) was available for use by many competitors. Intense competition among many rivals fostered rapid innovation. The cost of computing power plummeted. Even more markets opened as computers became both more powerful and more affordable.

Ten years ago (now 25 years ago) the world witnessed the fall of the Berlin wall. East Germans risked life and limb to pull down the wall. A throng of people rushed the gates to gain political freedom. The analogy can be made that existing BAS users were constrained people crashing the automation gateways, seeking market freedom. As we close out one millennium and embark on another, those in the BAS industry contend with two rival philosophies. While the 'Apples' and 'IBMs' of the industry promote closed, proprietary standards, a group of smaller "innovators" are embracing the open, Internet-compatible, BACnet

standard. In the Age of the Internet, you do not have to be a prophet to know which standard will come to dominate building automation systems.

"The significance of BACnet is not that it has become the dominant building automation control standard," he continues. "Look for it to become the dominant apparatus control standard. Your coffee pot, your garage door opener, your dishwasher, as well as your furnace, electric meter, room air conditioner, lighting, security, and fire alarm will be controlled using BACnet. An individual with a cell phone and the proper security code access will be able to remotely control and monitor just about anything that uses electricity. The translator that will allow all of these machines to communicate will be BACnet because BACnet uses the language of the Internet; sending e-mail to an Internet address is not technically different from sending a message to a thermostat that also has an Internet address."

Well, Regis vision for the future is playing out before us. Apple has once again become a domi-

nant force in both home computers and handheld remote devices. The Internet of Things is upon us and the Smart Grid is starting to impact networks of electrical generation, transmission and distribution equipment. BACnet is in place to handle the communication to the end user. And Drupal is now in play to freely filter and disseminate the high valued energy and environmental data from BACnet systems to "the people" where they want it.

ABOUT: David Thompson is a consultant working for Function1 a software company specializing in enterprise technology consulting. Mr. Thompson was a founding member of BIG-NA and served as a voting member on the BACnet Committee as part of the user community. After graduating from Penn State with simultaneous degrees in Architectural Engineering and Biochemistry, he worked 9 years as an HVAC and Electrical engineer, then 11 years as a researcher and engineer for Penn State while overseeing an environmental management program for the Pennsylvania Historic and Museum Commission. ■



David Thompson

Function1 | Consultant

david.thompson@function1.com | www.function1.com



FUNCTION1

BACnet Controls Installation Helps School Win National Energy Efficiency Competition

Claiborne Elementary School in Baton Rouge, La., won the Energy Star National Building Competition, The Battle of the Buildings, with help from a BACnet-based energy management system (EMS). Enhancements to the EMS reduced energy use and raised the school's Energy Star rating, enabling it to beat thousands of competitors from around the county and win the contest.

Louisiana Controls Inc., a Baton Rouge-based member of the InsideIQ Building Automation Alliance, completed facility controls and EMS upgrades that cut the school's energy use

nearly in half. Louisiana Controls provides facility controls systems, mechanical services and energy management solutions for a variety of commercial customers. Like other members of InsideIQ, an international alliance of independent building automation contractors, Louisiana Controls applies the latest technology to resolve customers' building control and energy management challenges and frequently uses BACnet-based applications.

Completed in 2011 for the East Baton Rouge Parish School System (EBRPSS), the 100,892 square foot Claiborne Elementary

School replaced a much smaller 60 year old facility of the same name and was designed to meet the requirements of ASHRAE 90.1 energy code. The initially higher energy operating cost for the new facility was a major challenge for the school district, due to modern requirements for integrated technologies, lighting, ventilation, humidity control and other construction codes for educational facilities. During the first year it operated, the new school's energy costs were \$ 2.07 per square foot, compared to a \$ 1.59 per square foot average for the old school during its final four years of operation.



Aramark, a leader in professional facilities services, is the energy management partner to the EBRPSS and supports the district's three facility controls and EMS partners, including Louisiana Controls, which has installed more than a dozen systems for the school district. Louisiana Controls implemented the BACnet EMS specified for the new Claiborne School, which included HVAC equipment controls and energy management functions.

During the post-construction warranty period, which was the first year of occupancy, Aramark energy managers worked with the school's principal and administrative staff to schedule and operate the facility as efficiently as possible, while maintaining required comfort conditions. Louisiana Controls provided valuable technical support and training on the operation of the new EMS, as well as timely troubleshooting and warranty repairs.

Once the warranty period expired, Aramark energy managers collaborated with Louisiana Controls to develop and implement specific modifications and refinements to the facility control sequences and energy management functions. Some of these included changes to ventilation control strategies to more closely match delivered fresh air ventilation volumes to the actual needs of occupied spaces, as well as the addition of discharge air temperature reset control during periods of normal humidity levels.

Louisiana Controls added a supply air set point reset off of the return air temp for all variable-air air handling units (AHU's) and programmed the adjustable functionality to shut the central plant down prior to the AHU's shutting down off of schedule. Louisiana Controls also integrated with the boiler controls on the project, allowing facility operators to read certain values which

would have only been available from internal controls. This fine tuning of the control sequence resulted in more efficiency for the school.

Taking advantage of the BACnet-based EMS's capability to analyze, trend and quantify control functions and system operation contributed to energy savings. Additional modifications and refinements to the EMS that further improved efficiency included adding demand-controlled ventilation, discharge air temperature reset and the ability to set back cooling, heating, and lighting levels when rooms are unoccupied.

The final result of all these modifications was a 46 percent energy savings at the Claiborne campus, reducing utility costs by almost \$115,000. Annual energy operating costs at Claiborne fell from \$ 2.07 per square foot in 2012 to \$1.32 per square foot in 2013, an improvement over the first year operations and well below the per square foot cost of the old school facility.

These efforts culminated in Claiborne School winning the 2014 Energy Star Battle of the Buildings award, sponsored by the U.S. Environmental Protection Agency (EPA). Teams from more than 3,000 buildings across the country spent the past year competing to obtain the greatest reduction in energy use and win the Battle of the Buildings.

More than 25 different types of commercial buildings were represented in the fourth annual Battle of the Buildings, which motivates building owners and occupants to improve energy efficiency, reduce harmful carbon pollution and save money. Competitors tracked their buildings' monthly energy consumption using EPA's online energy tracking tool, Energy Star Portfolio Manager. Nearly 50 buildings demonstrated energy use reductions of 20 percent or greater in a single year. Together, competitors saved more than \$20 million and reduced greenhouse gas emissions by more than 130,000 metric tons – equal to the annual electricity use of nearly 18,000 homes. ■

Number of Buildings:	1	Total Area:	100,892
Products / Equipment Installed:			
Schneider Electric I/A Series		Systems Integrated:	
		HVAC, boilers	
Controls Contractor:	Louisiana Controls Inc.		
BACnet Manufacturers:	Schneider Electric		



Tommy Reed
InsideIQ Building Automation Alliance | Chairman
treed@louisianacontrols.com | www.insideiq.org/index.php



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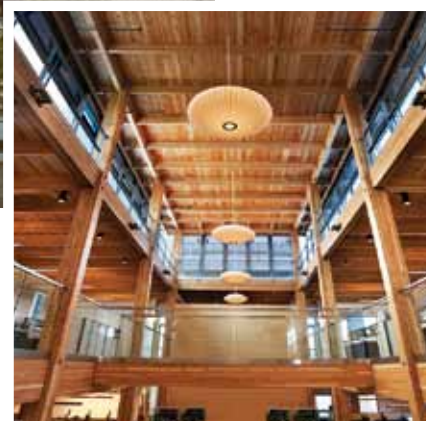
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The building is naturally ventilated by 57 trickle vents, which modulate and temper the natural flow of air into the building through a heating/cooling coil and damper. In winter, air is drawn from the building by an extraction fan with heat recovery. In summer and the shoulder seasons, a wind tower drives ventilation, using modulating dampers that open or close according to the wind

direction and speed. When necessary, hot water or chilled water is generated by two air source heat pumps, and delivered to the trickle vents and radiant floor. Lighting consists of modulating fluorescent fixtures with wireless control and daylight harvesting, as well as LED lighting. BACnet integration of the HVAC, lighting, and security systems allows occupied comfort settings to be enabled on a per occupant basis, triggered by unique security cards. Individual control of temperature, light, blinds, and occupancy is provided via LAN or wireless access from any computer or mobile device. ■

Karina Wright

Reliable Controls | MarCom Writer
KWright@reliablecontrols.com | www.reliablecontrols.com



Research for the Buildings of Tomorrow

Fraunhofer Uses Designo CC in its Research Work



CC also integrates all disciplines into a single management system, from building automation and fire safety to security and energy management. This approach simplifies operation, increases flexibility and lowers costs."

Next-generation management station

Designo CC not only makes it possible to integrate disciplines – including those of third-party manufacturers – but it is also an excellent choice for use as a modern management station for individual disciplines, such as building automation. What sets Designo CC apart is its extensive scalability, which makes it as good a choice for use in individual commercial buildings as in large, distributed building complexes.

At Fraunhofer CSE, for example, Designo CC automatically regulates the building's heating and cooling systems, depending on the time of day and the season, and thus optimizes comfort and costs likewise. At the same time, the management station acts as a central point for collecting building data of all kinds – temperature, humidity, CO2 concentration, occupancy, etc. – and helps to evaluate them. Other systems can use this information for additional tasks. Fraunhofer CSE uses the data to evaluate the characteristics and efficiency of materials and technologies tested in the lab, among other things.

Sidebar – Support for the latest BACnet standards

Designo is the world's first building management system to also support the integration of BACnet/IPV6 devices. It continues to support the tried-and-tested BACnet/IPV4, BACnet/LonTalk and BACnet/MSTP communication protocols. Designo is thus well prepared for future innovations in both IT and building automation and offers the highest possible investment security and future viability. The Designo CC management station also complies with the most powerful respective BACnet function profiles, B-AWS (ASHRAE) and MBE-B (according to the German AMEV guidelines).

The Boston-based Fraunhofer Center for Sustainable Energy Systems (CSE) has been using Siemens' new Designo CC management station since the spring of 2013. Not only does this station maintain a comfortable climate and good security in the building, it is also actively involved in the research activities.

The German Fraunhofer Society is one of the largest and best-known organizations dedicated to applied research on behalf of private business and the public sector worldwide. Fraunhofer CSE conducts research in the fields of solar energy, photovoltaics and building automation – and has turned out to be an ideal customer for Siemens' new Designo CC building management station.

ding, a more than 100-year-old renovated brick structure in Boston's "Innovation District," which the organization has occupied since April 2013, is being integrated into the ongoing scientific work as a research object. The facilities are being used for intensive research into the building technology of the future. Many of the systems installed by the engineers for test purposes are unique – and yet they can still be integrated into Designo CC. "Designo CC is based on open protocols, which makes it easier to integrate a wide variety of disciplines and systems to the greatest extent," explains Tom Rule, who works at Siemens Building Technologies as a product manager for Designo CC. "Designo

How innovation comes about

Fraunhofer CSE expects its building management system to meet strict requirements. The main build-



Rocco Derrigo

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Andy McMillan
President and Managing Director
BACnet International

Volker Röhl
President
BACnet Interest Group Europe

AMERICAS

Chicago, IL, USA	Apr 14 th , 2015
Seattle, WA, USA	Apr 21 st , 2015
Buenos Aires, Argentina	Apr 28 th , 2015
Sao Paulo, Brazil	May 5 th , 2015

EUROPE – MIDDLE EAST – AFRICA

Abu Dhabi, UAE	Jun 2 nd , 2015
Warsaw, Poland	Jun 9 th , 2015
Berlin, Germany	Jun 16 th , 2015
Cape Town, South Africa	Jun 23 rd , 2015

ASIA PACIFIC

Pune, India	Nov 5 th , 2015
Singapore	Nov 12 th , 2015
Beijing, China	Nov 19 th , 2015
Tokyo, Japan	Nov 26 th , 2015

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The BACnet Global Roadshow – Our Stops:

April 2015
14th

Chicago, IL, USA

Ted Ruswick

Campus Automation Specialist
at Loyola University, Chicago, IL

"The first summer of operation with BACnet was the smoothest summer ever in terms of customer satisfaction. Plant efficiency improved dramatically, with chiller plant differential increasing on average 8 to 9 degrees F. Comfort complaints virtually disappeared. Staff can respond to service requests from anywhere on or off campus via any PC with Web access or from their wireless PDAs."

Loyola University

Loyola University's Lake Shore campus is home to 8,000 undergraduate students and consists of 44 buildings spread over 100 acres. The Jesuit campus is home to the College of Arts and Sciences, the Institute for Environmental Studies, the Niehoff School of Nursing, the School of Education and Graduate School. The campus also includes the main libraries and sports centers.



April 2015
21st

Seattle, WA, USA

Bert Gumeringer

Director of Facilities Operations
and Security Services,
Texas Children's Hospital

"Managing information is now the key activity for facilities management. Getting arms around information and using it to make business decisions – that's where facility professionals can shine. The business of facility directors is viewed as a cost center but we can have a great deal of influence on the profitability of our hospitals. I can, for example, save one to two million dollars a year by properly managing energy."

Texas Children's Hospital

located in Houston, is a not-for-profit organization. The facility operations team, under Bert Gumeringer, focused on the West Tower, with 21 floors and a 639-bed capacity. Texas Children's Hospital is recognized by the American Society for Healthcare Engineering (ASHE) for cutting energy consumption by up to 15 percent. This ROI in facility management allows the hospital to invest more in patient care.



April 2015
28th

Sao Paulo, Brazil

May 2015
5th

Buenos Aires, Argentina

Be successful

The BACnet Global Roadshow will start in Chicago, Illinois and present the standard in Building Automation ANSI/ASHRAE 135 (ISO 16484-5) all around the world. This is why you should not miss the BACnet event in your area. Visit www.bacnetroadshow.org for more details and information on how to join our events!

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Why should you attend?

Go for reliable solutions

- make secure decisions about investments
- plan extensibility
- optimize availability

Discover open communication

- realize the capabilities of open systems
- turn away from proprietary building management
- get a unique overview on the leading open communication protocol for building automation
- get familiar with the global BACnet certification system

Realize efficiency

- improve building energy efficiency
- meet environmental standards
- fulfil legal directives
- establish building cost efficiency

Integrate the future

- connect your buildings to the internet of things
- connect web services
- optimize the security of building management systems
- connect to smart grids
- connect to business application systems

- connect to automation engineering
- integrate safety and surveillance systems

Be successful

- update yourself on the newest extensions of the standard
- learn from best practices
- exchange experience and expertise
- broaden your BACnet knowledge
- join user groups
- improve your chances of success

Who should attend?

By functions

- Architects
- Building engineers
- Building managers
- Building owners
- Building services managers
- Communication engineers
- Construction engineers
- Consultant engineers
- Developers
- Distributors
- Energy managers
- Facility managers
- Information officers

- Integrators
- IT professionals
- Journalists
- Planners
- Public administration representatives
- Sales engineers
- Specifiers
- Standardization manager
- Students, teachers
- Suppliers
- Trainers

By types of buildings

- Administrative buildings
- Airports
- Convention facilities
- Cultural complexes
- Education centers
- Exhibition centers
- Factory buildings
- Hospitals
- Hotels
- Industrial buildings
- Office buildings
- Public authorities
- Science parks
- Sport arenas
- Stores and whole sale buildings
- Universities

June 2015
2nd



Abu Dhabi, UAE

Jayaram Nagesh Mendon
Senior Sales Manager
BMS & Automations Systems of
SIBCA Electronics.

"Using Alerton and BACnet allowed us integrate with the lighting control system from Siemens, the fire alarm system from Simplex, to monitor status of the Inotec emergency system, and to interface with Johnson Controls' access control and CCTV systems."



June 2015
9th



Warsaw, Poland

Ireneusz Rzczkowski
Product Manager KNX
at Merten Polska
General Manager at
Tokka Sp. z o.o.

"BACnet as the fast building automation protocol is the most suitable solution for commercial buildings (offices, airports, railway stations, trade centres etc.) where in the time unit uncountable number of data is transferred among plenty of devices installed in such buildings. Especially in the field of HVAC when demand for the system is to provide fast and reliable transmission, which in addition, is the base for local and remote monitoring of all the system events. It can be easily integrated with KNX technology which is well established for the intelligent control of functions like e.g. lighting or shutters."

June 2015
16th



Berlin, Germany

Ralf Hasselbach
Technical University of Dresden

"Energy management means structure and with BACnet such a structure is easily conceivable. BACnet is the only technology that offers standardized objects such as Structured View for meter structures or the Accumulator Object. Such elements help technical systems to document themselves. In an age in where everything is faster and one has to work with an ever-changing staff, good documentation is invaluable."



June 2015
23rd



Cape Town, South Africa

Neil Cameron
Johnson Controls,
Area General Manager,
Building Efficiency, Africa

"At Cape of Good Hope, the second series of BACnet events closes; like the remarkable landscape, BACnet has been a solid rock in South Africa since its appearance about 10 years ago. The first South-African BACnet project was the Melrose Arch project in Johannesburg. Eversince, BACnet has started its winning-streak also in ZA and is nowadays the most important and most valuable element in Building Automation."



The Asia-Pacific events will be introduced in the next issue.



About BACnet International

BACnet is an industry association that facilitates the successful use of the BACnet protocol in building automation and control systems through interoperability testing, educational programs and promotional activities. The BACnet standard was developed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and has been made publicly available so that manufacturers can create interoperable systems of products. BACnet International complements the work of the ASHRAE standards committee and BACnet-related interest groups around the world. BACnet International members include building owners, consulting engineers and facility managers, as well as companies involved in the design, manufacturing, installation, commissioning and maintenance of control equipment that uses BACnet for communication. For more information, please visit www.bacnetinternational.org.

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New to the BACnet International Family

Member of



BACnet International is the international organization that encourages the successful application of BACnet through interoperability testing, educational programs and promotional activities. BACnet International complements the work of other BACnet-related groups whose charters limit their commercial activities.

BACnet International community membership includes a who's who list of top tier companies and industry professionals involved in the design, manufacturing, installation, commissioning and maintenance of control and other equipment that use BACnet for communication.

We are also proud to have welcomed the following new members to our ranks in 2014:



MechoSystems

MechoSystems has been the leading innovator of manual, motorized, and automated solar-shading and room-darkening solutions for more than 50 years. MechoSystems was formed in 1969 when the MechoShade® window-covering system was developed. It fit the industry's need: an alternative to any other window-covering solution available. The original manually operated roller-shade system is no longer the only of its kind. But no others come close to offering the durability and reliability that its unique, patented design provides. An entire industry has grown out of imitations. No competing roller-shade manufacturer can actually deliver Solar Protection with a View. Conversely, MechoSystems founder Joel Berman has the research, data, and patents to guarantee it.

MechoSystems
United States
Silver Member of BACnet International
www.mechoshade.com



TekAir Systems, Inc.

Tek-Air has provided laboratory airflow control systems since their incorporation in 1983. The experience gained through the completion of hundreds of installations, for a wide variety of customers, is reflected in their design philosophy. Their design for each project is intended to embody the following key elements of this philosophy.

TekAir Systems, Inc.
United States
Silver Member of BACnet International
www.tek-air.com

The Number of BTL-Listed Products Keeps Growing

This year through testing, the following vendors' devices have earned the right to display the BTL Mark.

The BTL-Listing is a testimonial that the product was subjected to rigorous verification by testing, demonstrating that it correctly implements interoperable BACnet. That requirement is steadily becoming the benchmark stated in project specifications, to avoid sub-standard implementations. The BTL Mark is permitted to be displayed on devices which have passed BTL Testing. Testing ensures that a device correctly implements all of the BACnet functionality that it contains. ASHRAE standard 135.1–2011 and the BTL Test Plan governs the testing. There are three documents required to be filled out and mailed/emailed to btl-manager@BACnetinternational.org in order to make application for tes-

ting and commence the testing process. Fillable forms and instructions describing the entire testing process are in the 12.0 test package, at www.BACnetinternational.org/associations/8066/files/BTL_Test_Package_12.0.final.zip. The BTL Checklist and BTL Testing Application determine the testing which will be performed. Every device is different, but a schedule estimate and test case can be created from those two documents. A signed BTL Testing Agreement and US \$1,000 deposit secures a place in the test queue. BAC-

net International member companies at Silver level or higher receive a discount on testing fees. It is common for testing and a Listing to apply to a family of devices that share underlying BACnet software. We test only the BACnet functionality. If the same firmware is used in common amongst devices, one testing and one Listing can apply to the family. If you have any further questions please do not hesitate to ask. I look forward to seeing your application for BTL testing. ■



Emily Hayes

BTL Coordinator

btl-coordinator@bacnetinternational.org



ABB

- E-Clipse

Airtek

- Airtek AWS
- Airtek OWS
- DAC
- DSC DSF
- GC-RB23
- Operator Display Panel

ALC

- LGR-Line
- ME812U-LGR
- ZN341V

Azbil

- Azbil InfBC

Beckhoff

- Beckhoff TwinCAT

Belimo

- Belimo P6

Bosch

- Bosch Heatronic

Carrier

- iVu CIV-OR
- MPC-Open-XP

CtrlAppl

- CtrlAppl LT
- CtrlAppl LT-PQ-GR-MC IP
- CtrlAppl LT-PQ-GR-MC MSTP
- CtrlAppl Elnet

Distech

- Distech ECB-PTU series
- Distech ECB AAC
- Distech ECB series

Delta

- Electric DAC
- Electric DSC DSF
- Electric GC-RB23
- Electric Operator Display Panel

Dwyer

- Dwyer CDTA

Ebtron

- Ebtron GTC116
- Ebtron GTM116

FieldServer

- FS-B35XX
- FS-QS-1010

Fuji

- Fuji Frenic

Gavazzi

- GFR ems2

Greystone

- CO₂ Detector

Grundfos

- CIM500

HNW

- HNW Centraline ARENA-AX OWS
- HNW CentraLine Eagle
- HNW ExcelWebII
- HNW Spyder

Honeywell

- CPO-DIO

Johnson Controls

- JCI FAC361x
- JCI Fxexplorer
- JCI NIE
- JCI ODS

Kamstrup

- MULTICAL-602

KMC

- AG-BAC-4000
- KMC BAC-8x0x-03
- KMC SimplyVAV

Lennox

- Prodigyll

LG

- SmartGreen

LGE

- PNF-PQNFB
- PQNFB17C1

MREng

- mrBCON
- Smartrol

OEMCtrl

- IOZone
- LGR 812u
- Prtl-Pro

Phoenix

- Phoenix Portal
- Phoenix RoomController
- Phoenix RoomIntegrator
- Phoenix RoomManager
- Phoenix Supervisor

Price

- CriticalCtrls

Regin

- ExoCompact

SAMSON

- TROVIS

Sauter

- ecos500
- modu525

Schneider

- ENS-BAC-AWS
- iEM3365
- NXT
- OWS
- TRD

SE-Elektronik

- E-DDC-3.2

Shina

- Shina FCU-series

Siemens

- Siemens Desigo
- Siemens PTEC
- Siemens PXC22
- Siemens PXC3
- Siemens PXC001
- Siemens PXC3
- Siemens PXG3

Toshiba

- BMS-STBN10E

Trane

- TR150
- Tracer-ES

Trend

- IQ4

Triatek

- xMS-165x

Tridium

- JACE-3E

Unitec

- BAQ08V

WAGO

- 750-831

Yaskawa

- Z1000

Calendar of BACnet International Events

Dates 2015	Location	Event	Highlights
January 26 – 28, 2015	Chicago, IL	2015 AHR Expo	BACnet International booth
March 10 – 12, 2015	Baltimore, MD	NFMT 2015	BACnet International booth
April 14, 2015	Chicago, IL	BACnet Global Roadshow	Celebrates the 10 th DIN EN ISO anniversary and the 20 th ANSI anniversary of the BACnet standard
April 21, 2015	Seattle, WA	BACnet Global Roadshow	
April 28, 2015	Buenos Aires, Argentina	BACnet Global Roadshow	
May 5 – 7, 2015	New York, NY	LIGHTFAIR International	BACnet International booth
May 5, 2015	Sao Paulo, Brazil	BACnet Global Roadshow	Celebrates the 10 th DIN EN ISO anniversary and the 20 th ANSI anniversary of the BACnet standard
June 2, 2015	Abu Dhabi, UAE	BACnet Global Roadshow	
June 9 – 10, 2015	San Antonio, TX	IB Con	BACnet International booth
June 9, 2015	Warsaw, Poland	BACnet Global Roadshow	Celebrates the 10 th DIN EN ISO anniversary and the 20 th ANSI anniversary of the BACnet standard
June 16, 2015	Berlin, Germany	BACnet Global Roadshow	
June 23, 2015	Cape Town, South Africa	BACnet Global Roadshow	
Septemer 30 – Oct 1	Orlando, FL	WEEC	BACnet International booth
October 27 – 28, 2015	Orlando, FL	NFMT Orlando	BACnet International booth (member product showcase display) and education track
November 5, 2015	Pune, India	BACnet Global Roadshow	Celebrates the 10 th DIN EN ISO anniversary and the 20 th ANSI anniversary of the BACnet standard
November 12, 2015	Singapore	BACnet Global Roadshow	
November 19, 2015	Beijing, China	BACnet Global Roadshow	
November 26, 2015	Tokyo, Japan	BACnet Global Roadshow	

Information about all Events: Natalie Nardone, CAE, CMP, BACnet International Office, natalie@bacnetinternational.org

BACnet International Journal 9

The BACnet International Journal is a global magazine for building automation based on BACnet technology. Experts, practitioners and professionals show the way in applying and developing the BACnet standard – from building automation trends to devices and application projects; from qualification and training to testing and certification; from who's who in the BACnet community to useful information on events and publications. Special attention is given to members and activities of BACnet International.

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