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BACnet International JOURNAL

Issue 11

This Issue

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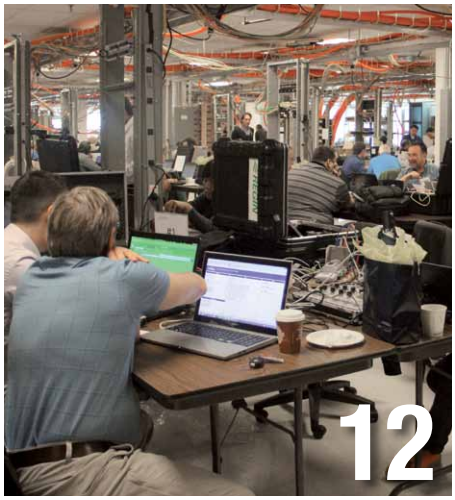

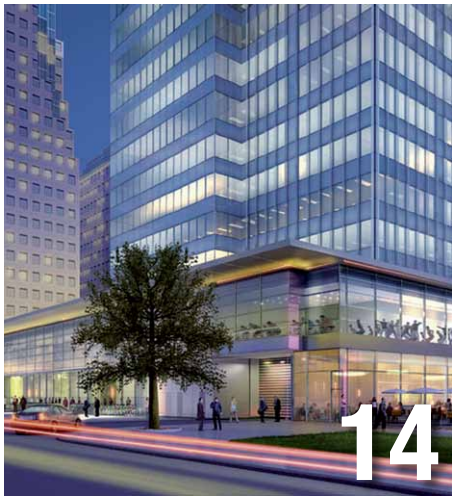

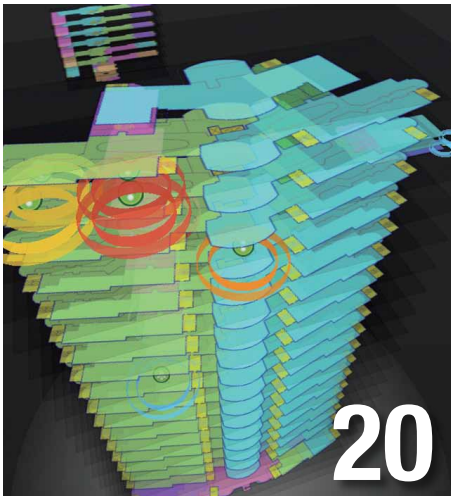

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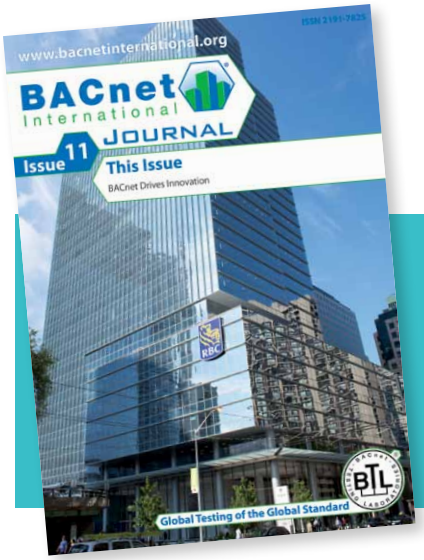

Cover picture:

The WaterPark Place III building in the heart of downtown Toronto is the first LEED® Platinum Core and Shell Tower in the city. Read more on page 14.

Photo courtesy of Delta Controls Toronto

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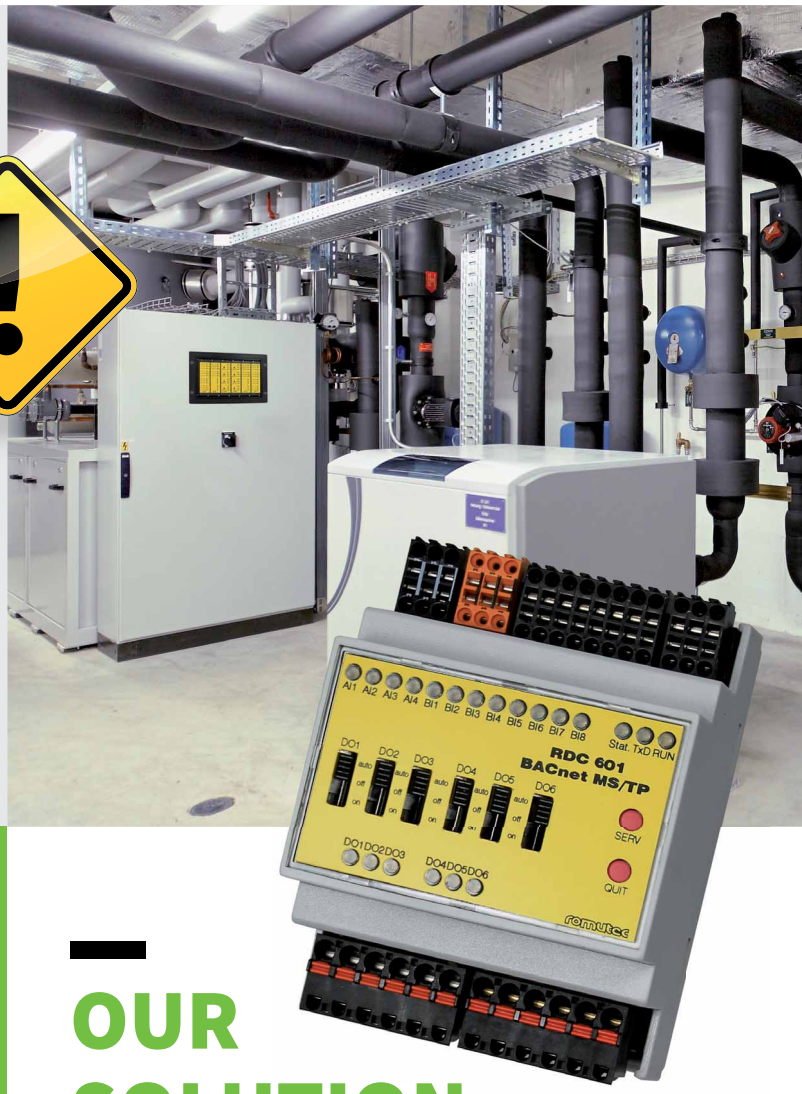

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Using Product Information to Generate Innovative Control

BACnet has the ability to drive innovation, but BACnet alone does not *guarantee* innovation. To truly achieve an innovative solution, there must be knowledgeable people that can take advantage of all the information that BACnet makes readily available. We live in a world of "big data", yet we are still learning what to do with that data. This article discusses a real world example, and since this BACnet Journal theme revolves around driving innovation, this article will use variable frequency drives (VFDs) as the basis.

An air handling unit (AHU) feeding a variable air volume (VAV) system will be used as the real world example. A VAV system requires that the VFD adjusts the supply fan speed in order to maintain a specific duct static setpoint. How is the VFD controlled? That is the beginning of a decision tree that could lead to a reliable and innovative solution, or lead to a bare-bones, get-the-job-done solution.

As with most applications, there is no single, one-size-fits-all answer. Our industry often requires we get projects done quickly and meet deadlines. At the same time, we also strive for quality and innovation, which creates an interesting challenge that we must balance. The beauty of BACnet is that it quickly gives us the information available to be innovative.

Many modern day VFDs, specifically ones designed for the HVAC market, have BACnet included as a standard feature. Some VFD packages have over 100 points of information available over BACnet. Simply landing a twisted pair (plus reference) wire on the VFD, and connecting it to the building automation system (BAS), does not result in innovation. However, by knowing which points to monitor and/or control, the VFD can become a small but important part in having a state-of-the-art facility.

A system designer goes through a three-step process in order to take full advantage of the ability of a VFD:

1) How to control the VFD
2) Choose which points of information to monitor from the VFD via BACnet
3) Decide what to do with those points

There are a couple VFD control methods available for VAV systems. Either the AHU controller provides the VFD with a duct static pressure setpoint, or the controller simply tells the VFD how fast to run. The most reliable solution often involves moving the intelligence as close to the final application as possible. Thus, in this case, the more innovative solution has the VFD receive the pressure setpoint, and in turn use its internal PID control loop to determine the appropriate fan speed required to reach the static setpoint. The advantage to this solution is that an "upstream" control hardware failure (perhaps a controller or wiring issue) may not cause the air handler to stop operating. Instead, the VFD will remember the last known good static setpoint command and continue to modulate fan speed as needed to maintain that setpoint. The duct static setpoint and run command can be sent from the AHU controller to the VFD via BACnet; there is no need to run wires for an analog signal or relay contact run command.

Control the Danger

The AHU may have a supply fan isolation damper. How should we control the damper? Again, we have choices: the VFD can handle the logic or the AHU controller can handle the logic. If you said the VFD should handle the logic, you are correct. Most HVAC VFDs on the market have a basic damper interlock logic configuration, a feature that works in both Auto and Hand modes. Imagine if you went with the alternate solution of the AHU controller handling to damper logic. Now consider the scenario where the system wasn't running due to some random problem, and as a result the controller closed the damper.

After some occupants complained about the air being stuffy, a well-intentioned maintenance worker goes up to the VFD and presses "Hand" so they can at least get some air circulating in the occupied zones. Initially there will be no air movement because the damper is still closed, so the maintenance worker keeps speeding up the fan until the pressure builds up to the point where damage occurs. This scenario likely plays out every single day somewhere in the world. Had the damper logic been controlled via the VFD, once the "Hand" button was pressed, the damper would have opened before the VFD started to ramp up the supply fan. The AHU controller and/or BAS can still monitor damper position by reading BACnet status points from the VFD.

An AHU feeding a VAV system will likely have multiple safeties. High static cutout, freezestat, firestat, and smoke alarm are just some examples of possible safeties. Using the high static cutout as an example, how should we handle the control of this safety? By now I expect you already know the answer: the VFD. We wire safeties to the VFD because of that well-intentioned maintenance worker, and his instinct to put things in "Hand" mode.

With the safeties wired back to the VFD, they are still active in "Hand" and thus will protect the system. If the safeties are wired back to the AHU controller, then the safeties could be ignored once the VFD is in "Hand" mode. Landing the safeties at the VFD increases reliability, but isn't necessarily innovative. The innovative part comes into play by how the safeties were landed. Far too often safeties are all wired in series with each other, so if any safety opens up, the equipment will stop operating. But in that situation, there is no initial indication of which safety opened up, there is simply a general alarm.

Make life easier

An innovative thinker will wire the safeties back to separate inputs on the VFD. Thus, the four example safeties mentioned earlier, would be wired to four separate safety inputs on the VFD. Since they are wired to different inputs and those different inputs can be monitored via BACnet, we would know exactly which safety opened up. Now the facility manager can be at his desk with his computer, or perhaps in his pajamas at home with his laptop, and know exactly why that AHU just shut down. The time

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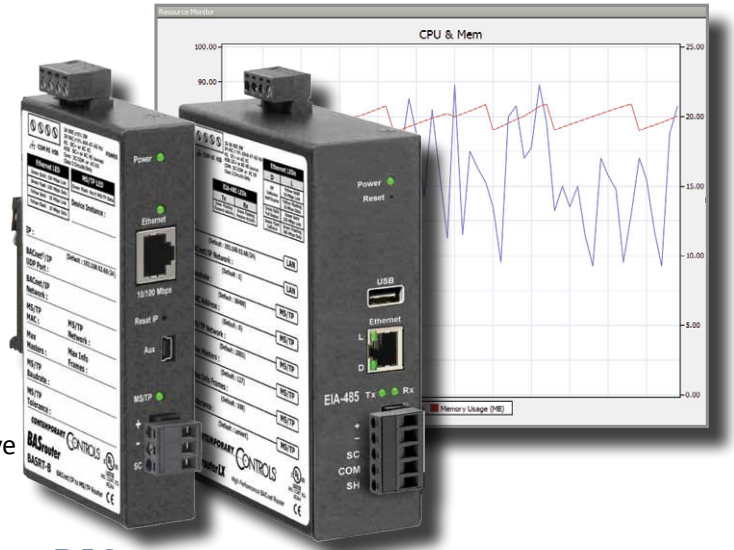

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needed to troubleshoot is greatly reduced, and the solution may be known before arriving at the AHU. Is this type of innovation going to change the world? No. But this is an example of the little things a good designer/installer can do to make life easier on those who work on equipment.

The aforementioned examples included a small sampling of VFD points available via BACnet. Below are some of the most useful points, along with information on why and/or how it is useful.

- Hand Status: Do you remember our well-intentioned maintenance worker? Monitoring if a VFD has been put into "Hand" mode, and having the BAS provide an alarm if such an event occurs, will result in energy savings. Far too often, a VFD is put into "Hand" mode, and accidentally left in that mode at some fixed high speed, possibly for years. Saving energy is one of the main reasons VFDs are used on most sizeable HVAC pumps and fans. Energy savings occur when the VFD slows down the motor. Leaving the drive in the manual "Hand" mode does not allow the VFD to slow down the motor.

- kWh Meter: Many VFDs on the market have output kWh power meters built in as standard. This meter indicates the amount of energy the motor is consuming. Going back to the VAV example, the fans will make up the vast majority of power consumption by that AHU. There is no need for a dedicated sub-meter for that AHU. Without any extra hardware, and simply by using what is already available in the VFD, we know approximately how much power each AHU consumes. The knowledge of where one's energy is being consumed is a great first step for an owner to come up with innovative solutions in reducing energy consumption. Trending this information also assists in further understanding peak energy usage periods. As an added bonus, using this kWh data can be used towards LEED certification, such as under the Measurement & Verification category.

- Run/Stop Status: There is no need for a relay output from the VFD, run/stop status can be determined over BACnet. The BAS may generate an alarm if the VFD is doing the opposite of what it was being told.

- Fault Status: Not only can the VFD tell the BAS if it is faulted, but it can also indicate what type of fault occurred. Faults can even be reset over BACnet with some VFDs. As an example, assume a hospital's AHU supply fan VFD faults at 2 a.m. during thunderstorm. The facility manager wakes up after receiving a text from the BAS, alerting him to the situation. On his phone he logs into the BAS system remotely, and sees that the VFD tripped on over-voltage. He resets the VFD fault remotely, watches the fan speed ramp up resulting in the duct static pressure reaching its setpoint. He sees the motor is drawing appropriate current, nothing abnormal, and after chalking it up to a voltage surge due to a lightning strike, he goes back to bed. There was no need to send someone out to look at it at 2 a.m., no overtime charge to go in himself, no climbing onto the roof in the dark during a thunderstorm, and less down time of the equipment.

- VFD Output Frequency (Speed) & VFD Output Current (Amps): Reference the previous example.

- Run/Stop Control: By moving start/stop control over BACnet, opposed to a hard-wire relay contact, there is upfront cost savings due to less I/O from the controller and less wires that need to be pulled.

- Speed Control or Reference Signal: Sending the signal over BACnet, opposed to a hard wire 4-20 mA or 0-10 VDC signal results in upfront cost savings.

- Analog Input Monitor: Using the previous VAV example, the duct static pressure sensor is wired back to the VFD's analog input. That analog input can be monitored by the BAS, thus allowing the BAS to know and display duct static. Even though the VFD is handling the fan speed control to maintain the setpoint, the BAS still should know the actual static value.

- VFD Temperature: A high temperature reading indicates it may be time for preventative maintenance (i.e. dirty heatsink) or possibly a failing cooling fan. Work can be done on the VFD before it fails. A half-hour investment in cleaning a unit or replacing a $200 cooling fan may save the owner from spending $5,000 on a replacement VFD.

- Bypass Status: Over BACnet, some VFDs are able to indicate if they have been placed in Bypass mode. There is no energy savings occurring when a unit is in Bypass mode.

The above are just some examples. The data can be used in a variety of different ways, and just scratches the surface of 100+ different BACnet points available. In the past, each of these data points would have required a dedicated analog output or relay output. Now it can all be communicated via a single cable with BACnet communications. This also provides incredible flexibility, as we can make changes on the fly and not have to worry about pulling more wire or add additional I/O to support our latest idea.

There have been many great technological advances in our industry over the past decade. More data is available to us than ever before. However, we have to be careful of not falling into the trap of buying the latest and greatest hardware, knowing it communicates via BACnet, and then mistakenly assume that the system will be innovative or state-of-the-art. Innovation ultimately comes from the people behind the scenes who design, install, and continually optimize the system.

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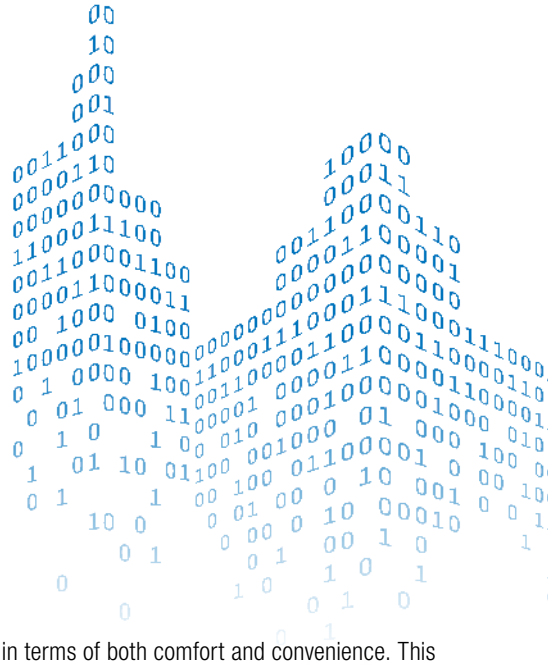
Tim Skell is a HVAC Application Engineer for VFDs at ABB. He has more than 10 years of experience with VFDs in the HVAC market. He is also an ASHRAE member and is an active member in the BACnet community, recently winning the BACnet Howler Award.

The Evolution of the Intelligent Building

From BACnet Toward Next Generation Systems



It is impossible to predict the future. Understanding the evolution of the intelligent building, however, helps us to not only better appreciate how far our industry has come, but allows us to better foreshadow how far it will go. To best grasp this progress, one must first understand what is meant by the term "intelligent building." Although it can be defined in multiple ways, the Intelligent Buildings Institute outlines it as, "one which provides a productive and cost-effective environment through optimization of its four basic elements: structure, systems, services and management and the interrelationships between them."[1]

Throughout the decades, the building automation industry has seen tremendous growth in terms of technology and innovation. What has remained, however, is a tendency to build these advances around various combinations of cost savings, energy efficiency, sustainability, and occupant appeal. By analyzing these pillars in light of the principle elements driving intelligent building progress, a better understanding can be gained with regards to what we were historically seeing in our industry, what we are seeing today, and what we will likely be seeing tomorrow.

Which elements are driving the evolution toward more intelligent buildings? The first such factor is underlying or enabling technologies. In our industry, this has primarily meant the introduction of communication standards and the reduced costs associated with microcontrollers. The second is the impact of fluctuating energy prices. Those who have been in the building automation sector over the past few decades have seen this, for example, in 2008 with the peak of oil prices at $145/barrel versus when the average price was $30/barrel throughout much of the 1990s. Another factor consists of challenges associated with running operations within ever expanding facilities. And finally – at least in recent years – the technological trends in the consumer market have had profound impact, particularly in terms of occupant expectations.

These elements help to determine the weight that the industry places at any given time on each of the intelligent building pillars. The following sections, tracing the evolution of the intelligent building, outline this interaction and help to best predict the future of the industry.

Yesterday's Intelligent Building

At its origins, the pursuit of an intelligent building was largely focused on cost savings, namely with regards to capital expenditure (CAPEX) and operational expenditure (OPEX). Building automation consisted of standalone systems for comfort-based temperature, access, lighting, and security. Each one of these systems operated in a silo, with their own respective trades, speaking their own protocols, and was serviced by different entities. Integrating these various standalone systems was often expensive and required gateway devices. With the cost of energy being relatively low, neither sustainability nor energy efficiency were of high priority.

Today's Intelligent Building

Today, the story of the intelligent building has grown and largely improved, but is not without its own set of challenges. Now automated and integrated at the building level, building automation tends to consist primarily of networked systems. The focus of the industry has developed beyond cost savings and comfort-based temperature to now include energy efficiency, climate control and, most recently, sustainability efforts.

Cost savings in relation to the intelligent building have successfully expanded to include operational savings via global logic and aggregated data. With the introduction of more sophisticated technologies and systems less likely to operate in silos, additional savings are now achieved due to less technicians being required. Intelligent buildings are also getting more sophisticated in terms of delivering services with exception base service (event driven), thus reducing operational costs.

Due to the increase in energy costs, energy efficiency has also become an important component in our pursuit of the intelligent building. The building automation industry has actively sought out ways to reduce energy wastage by finding synergies in a building's system. There has also been some progress in terms of unifying systems, primarily at the zone or room level, leading to an improved user experience in terms of both comfort and convenience. This unification of systems has increasingly become part of today's conceptualization of the intelligent building as it has enormous benefits from an energy perspective. For example, a study done by Hannover University's Applied Sciences department determined that simply eliminating systems operating in silos could result in energy savings of up to 30 percent on HVAC applications and up to 60 percent when applied to lighting and HVAC as a single unified system.[2]

BACnet at the Forefront

With the increased momentum towards environmental responsibility, the concept of intelligent building now also tends to include one that minimizes its carbon footprint. Consequently, the building automation industry now offers technologies such as energy dashboards and additional tools to share sustainability initiatives.

Other current trends include facilities integrating using gateways/protocol bridges or standardizing on a single control network protocol. However, it should be noted that these rarely cross disciplines, meaning that, even today, systems operating in silos still exist in new construction. Also pervasive in the industry are open protocols, with BACnet at the forefront of the movement towards standardized communications between building automation devices for more intelligent buildings.

[1] Caffrey (1985) Intelligent Buildings Institute, Washington DC

[2] Hannover University of Applied Sciences and Arts, Germany

Tomorrow's Intelligent Building

So, where does the story of the intelligent building go from here?

Although still unwritten, it is clear that the direction in which our industry is heading includes elements of profound change. Building automation will undoubtedly move even further towards a connected, single system approach, where the unification of HVAC, lighting, shades/sunblind, access control and CCTV will be considered standard. As the industry can no longer afford to focus on any one pillar, a holistic view of an intelligent building and its stakeholders will be required. The cost savings, energy efficiency and sustainability requirements of today will continue to be the key objectives of an intelligent building, as will occupant wellbeing and overall appeal.

Cost savings are likely to largely be pursued via a convergence between building automation systems and IT infrastructure. By leveraging a building's communication infrastructure, those in the industry will be able to take advantage of "free" wiring by eliminating fieldbus networks, as well as eliminate the costs associated with maintaining and upgrading multiple networks. This move towards a connected building will inevitably also facilitate integration with other building management functions over IP such as fire alarm, elevators, digital signage, parking access, etc.

In terms of energy efficiency, this movement towards IP-based solutions will mean a minimized impact on the envelope of buildings. The use of existing infrastructure and the possibility of scalability using modern, connected solutions are also expected to gain traction so as to address sustainability concerns.

The focus of the intelligent building will likely further expand to include occupant wellbeing. Our clientele is changing, becoming more sophisticated. We must consider user cases for the system from the end user perspective and specifications for the building need to reflect this new clientele and what they are expecting from their indoor environment. In addition, expectations for user interface and experience are changing, where mobility is king. Many of the devices being employed by occupants are using standard web API's and commands rather than industry or building specific interfaces. With this comes additional data, a more complex user story and the need for a place/repository to store and manipulate the data to present to different stakeholders.

Doing More with Less

Building appeal, or the attraction and retention of occupants, will also continue to gain traction in our pursuit of the intelligent building. Although doing more with less has been the message to date, to do this while still satisfying occupants means that the building automation industry will need to re-tool the entire infrastructure of devices currently offered. Technologies from just a short time ago can barely handle the data exchange required to truly manage all of the disciplines within the next generation of facilities. The communication mediums currently being used are changing too, including connectivity options, IT standards and security.

Other important trends that we can expect to see is the further interconnectedness of the intelligent building concept with that of the Internet of Things (IoT) building, cloud computing, mobility, further system consolidation, more applications and interconnectivity. Supporting this hypothesis are the results from the Economist which tells us that over 90 percent of business leaders expect to be using IoT technology in one form or another by 2016.

What makes the increasing speed of technological innovation so exciting – both in and outside of the building automation industry – is that anyone reading this article is truly poised to become the intelligent building expert of tomorrow. We are at a fascinating technological crossroads where those in our sector have the unique opportunity to define what our next generation buildings and systems will look like. So, yes, it is indeed impossible to predict the future. However, in the words of Abraham Lincoln, "the best way to predict your future is to create it."

ABOUT THE AUTHOR

Trevor Palmer, having joined Distech Controls in 2014, leads the company's marketing, customer service, product management and engineering departments. For more than 20 years, he has brought innovative concepts and energy management know-how to the industry, having held leadership roles in contracting, manufacturing and technical sales. Recognized as a building automation expert throughout North America and Europe, Palmer is instrumental in positioning Distech Controls as an industry leader in building automation technologies, while guiding the company's strategic development, market expansion and product line diversification. Palmer is also a former member of the BACnet International board of directors.

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Mark of Innovation: The Power of the BTL Mark

As more and more engineers, owners and operators specify the BACnet communication protocol for their facilities to achieve greater energy efficiency and interoperability, having BTL Listed products in your arsenal is a vital and powerful component of remaining relevant and competitive in the market.

Why Pursue the BTL Mark?

Triatek pursued the BTL Mark for multiple reasons. As a company, we strive to design and manufacture innovative products that are dependable, easy to use and make our clients' lives better. Attaining the BTL Mark is an industry benchmark that puts a stamp of approval on our products and communicates to clients that our products have passed demanding tests from independent labs.

We also need BTL Listed products to be competitive in the market. With BACnet increasingly becoming the communication protocol of choice for the universities and hospitals in which our products are used, having BTL Listed products is crucial, as it affects our ability to bid on certain projects.

When specifiers are set to the task of creating plans for a renovation or a new construction project that utilizes the BACnet protocol, seeing the BTL Mark on a product immediately signifies that they can trust the product will be compatible and integrate seamlessly with other products in the facility.

The BTL Mark can help you compete with the best and give you a powerful edge over your competitors if they do not have the BTL Mark. It symbolizes a superior product that can work well with others created by top manufacturers. If you want your organization to land installations with reputable owners and operators that utilize the BACnet protocol, you must pursue and achieve the BTL Mark for your products.

Other benefits include:

- BTL Listed products can recuse you from interoperability blame (and associated costs) if an issue arises during the commissioning phase.
- BTL Listed products are utilized by owners and operators with the BACnet protocol because it speeds up the installation process, lowers costs and makes the integration process go much smoother.
- The BTL Mark inspires increased buyer confidence when seeking new business or releasing a new product.
- Marketing benefits include having your product and organization listed on the BTL website, and the ability to list the BTL Mark logo on your product data sheets, manuals, website, etc., which increases your ethos as a quality manufacturer.
- If utilizing a sales representative network, the BTL Mark provides representatives with higher confidence levels in the product they are selling, which will increase your market share.

Lessons Learned and Recommendations in Preparing for BTL Mark Testing

Triatek learned several valuable lessons during the BTL Mark preparation process for our family of room pressure controllers and fume hood controllers.

In order to prepare for the arduous BACnet Laboratory testing, Triatek engineers completed multiple in-house trials. Our engineers compared the free, open domain software stacks to the commercial software stacks and determined that while there is a greater up-front cost, the quality and value of the commercial stacks greatly outweighs the seemingly free cost of the open domain stacks. Triatek engineers recommend using a commercial software stack vendor with a demonstrated history of success. Some reputable vendors include Cimetrics, Chipkin Automation Systems, and SoftDEL.

Internal yardsticks for product quality are often different than external yardsticks. External yardsticks can drive you to continuously innovate your product to the next level. The BTL Mark standards set a baseline to ensure products meet a specific quality level. Triatek's engineers went through several iterations of our software and fixed bugs that were identified during the preparation process to submit our products to the BACnet Laboratory. Preparing our products for compliance and interoperability testing resulted in a significant improvement in product performance.

Other recommendations include:

- Utilize all the resources on the BACnet International and BTL websites, as they are there for a reason and will help you be successful in your submission process.
- Participate in the annual BACnet International PlugFest, an event that allows vendors from around the world to test their products with other BACnet manufacturers. See more about PlugFest on page 12.
- Do not let the cost deter you from attaining the BTL Mark, even if you have to re-submit your product; the value is well worth the cost.

The BTL Mark is a respected designation within the industry, and the effort your organization will put forth to achieve it is worth the time, energy and associated costs. As you prepare your submission and conduct internal tests, you will organically bring performance improvement and a better user experience to your products.

The BTL Mark serves as a quality standard and provides buyers with assurance that a product has passed industry standard tests conducted by a recognized, independent testing organization. The BTL Mark is a way for numerous manufacturers to create an international product line that works seamlessly together.

ABOUT THE AUTHOR

Caroline Moore is the Marketing Manager for Triatek, a company that creates innovative airflow control products for critical environments like hospitals and laboratories. www.triatek.com.

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PlugFest: Inspiring Ingenuity Through Partnership

What is PlugFest? I wasn't really sure. I was asked to take one of Leviton's products to the 2015 BACnet International PlugFest. I found out that PlugFest is a wonderful opportunity to determine how well our BACnet system operates with other BACnet systems. As a newbie, I had no idea what this experience would be like.

I also had concerns about having to interact with customers and competitors and possibly causing issues for our company. Nothing could have been farther from the truth; at least based on my experience. The spirit of cooperation and camaraderie was so strong. There were no worries about who were competitors, customers or vendors.

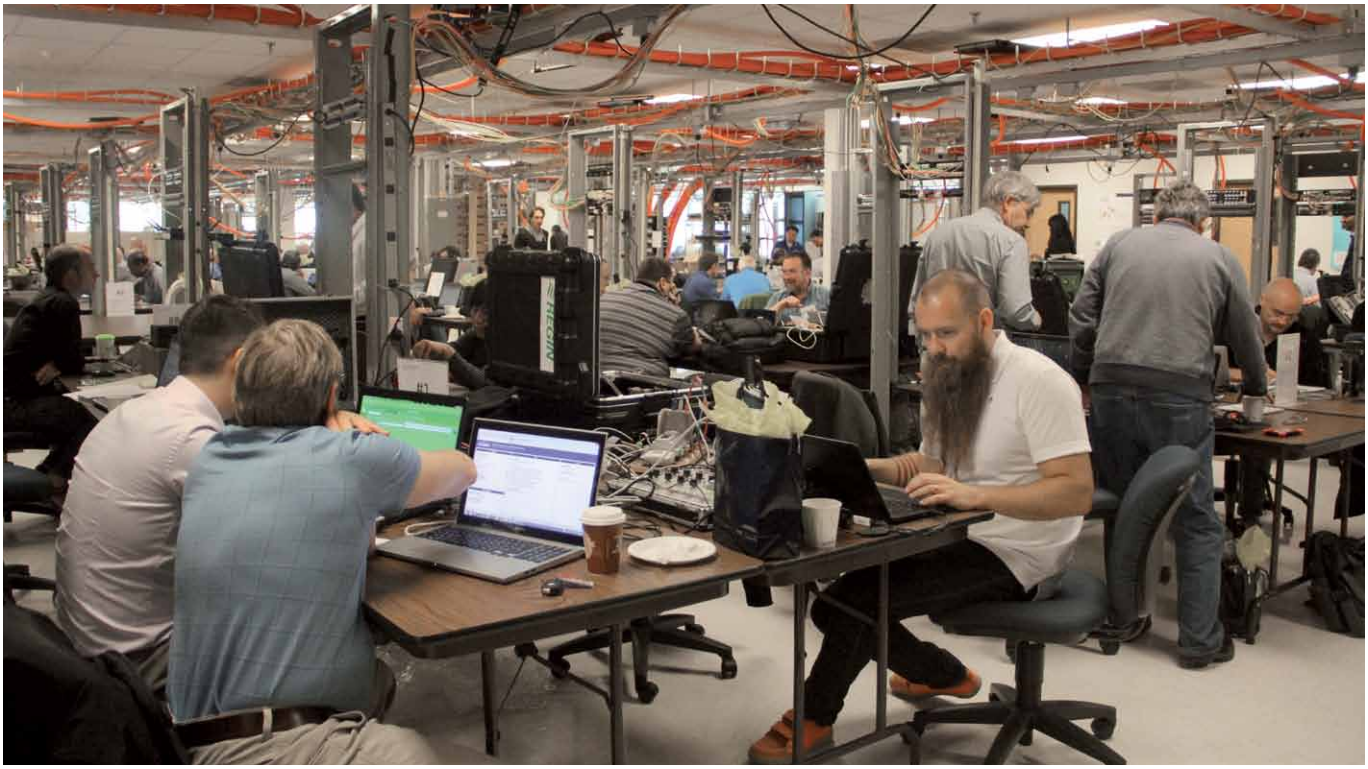
Allow me to share a snippet of my experience as a PlugFest "first timer."

The event was held at the University of New Hampshire's InterOperability Lab; a beautiful facility in Durham, NH. It was especially nice since it was fall and nature's colors were starting to change. For those staying in Portsmouth, NH there were busses that took care of all the driving so commuting was stress-free. We were treated to lovely scenery of greens, yellows and reds as we commuted from Portsmouth to the testing facility. I knew that the week would go well when I got to the testing site and checked in. The people running it were friendly, helpful and understanding.

There were teams from all over the world there to participate in PlugFest. I had the opportunity to interact with teams from Europe, Asia and North America. This reinforced for me that BACnet truly is an international standard. There were teams representing the spectrum of functionality, from companies that provide embedded stacks; companies that have end control devices; companies that provide the clients that control buildings and campuses; all the way to companies that provide solutions that span the entire range.

When we started the actual testing, we were paired with different companies that have complimentary roles. Sometimes we were paired with teams from companies that had a lot of experience and could help the new folks out. Other times we were paired with folks relatively new to BACnet. Everyone had a wonderful spirit of cooperation. It didn't matter if we were competitors, vendors or customers. We all had an opportunity to test our functionality and see what worked great and what needed some additional attention. During the process, as we discovered oddities, the more experienced individuals would help educate the newer folks on how things were intended or expected to work. This was a great opportunity, especially for some of us who had done most of our development based on the standards but didn't have much of an opportunity to interact with other systems.

A typical day of testing consisted of approximately three to four test pairings or round table sessions. For a test pairing, the two teams would identify what they were going to test. As each feature was tested, anything that didn't work as expected would be explored and the respective team would capture what it needed to be able to address the issue when they



returned home. Sometimes these issues were simple mistakes and others where different interpretations of the standard. When the latter would occur, there were always helpful people available to provide clarification as to what is intended in addition to what is captured in the standards. This provided the newer teams with a great opportunity to expand their understanding as well as identify directions on how to resolve issues we uncovered with our testing. The round table testing was similar but with more teams all working together to see if there were issues with competing bus traffic.

As for the InterOperability Lab at the UNH, this facility was wonderfully suited for this event. It had plenty of connectivity to support setting up the stations for testing for individual pairings, as well as the larger round table testing where many systems were all operating on the same network. There were opportunities to tour the facilities and learn about the capabilities of the lab along with their future plans moving forward. They have a bright path moving forward and are really excited for a new building closer to campus which should be up and working in time for next year's PlugFest.

During PlugFest, attendees also had opportunities to hear presentations on the future plans for BACnet International, as well as experiences from the real world. There were presentations on practical experiences and how features and approaches can help when deploying systems in a real world and things don't go as smoothly as they do in the laboratory. The ability to share experiences like this in a cooperative environment is definitely a positive contribution to those who have the opportunity to participate in this event. The future certainly looks bright for BACnet, and the plans are continuing to move BACnet in a direction that will solidify its place as the leader in building automation.

PlugFest also provided opportunities for attendees to interact with one another in a non-technical manner. There was a wonderful evening cruise on the Piscataqua River with music, food and beverages that encouraged folks to interact in a social setting without having to worry about the technical aspects of the event. This was well received and appreciated by everyone. There were also teams taking advantage of the opportunities to go out to dinner together on the other nights, allowing them to be able to interact in smaller, one-on-one style settings.

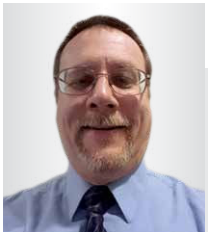
One of the things that struck me as unusual was the true spirit of cooperation during PlugFest. When we were testing, it really didn't matter if we were competitors. We were all there for the same goal of making it work for the customer. It didn't matter that we may be trying to get that same customer. We wanted it to work for them and work correctly. We would go back to competing on merits and features after we fixed the things that kept it from working for the end user. By sharing our experiences, we were all focusing on moving the standard and customer experience forward.

When the event was over and I got back home, I was asked "Was the trip worth it?" My answer was a resounding "YES!" We were able to test our products with other systems and as expected found some things to work on. We learned where BACnet is planning on going so we can align our future plans. We shared real world experiences that helped reinforce those things we are doing right and identify those things that we may consider adding in the future. We made useful contacts and new friends within the BACnet community.

Overall, it was a wonderful experience which I hope to have an opportunity to repeat in the future. If you are wondering if participating in a PlugFest would be useful for your development, I would highly recommend that you plan on participating in the 2016 PlugFest event, which is scheduled for Sept. 26 – 29, 2016 at the UNH InterOperability Lab. For more information, visit www.bacnetinternational.com.

ABOUT THE AUTHOR

David Burgess is a senior embedded software engineer with Leviton Manufacturing, Inc. He has over 30 years of embedded software experience in the high tech industry working for companies like Leviton, Tektronix and Hewlett-Packard/Agilent. He has been working with lighting systems and BACnet interfacing of those systems for the past six years. Burgess lives in Portland, Oregon with his wife and has three grown children. He enjoys cooking, serving his church and is a licensed Extra Class Amateur Radio Operator.



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WaterPark Place III Reaches Out for Technology

The WaterPark Place III building in the heart of downtown Toronto is the first LEED® Platinum Core and Shell Tower in the city. WaterPark Place is the global flagship for Oxford Properties as the first smart connected building of its kind and is the new home of CISCO Systems Canada and Cisco's New Internet of Everything (IOE) Innovation Centre. Adding to this building's accolades, at the time of construction WaterPark Place was the largest Cisco Smart Building PoE installation by Delta Controls, containing over 1,800 Delta PoE VAV controllers.

The Challenge

How do you keep buildings up to do date with today's advancing technology? WaterPark Place III, CISCO Canada's new headquarters needed to showcase cutting edge technology and demonstrate what SMART buildings can achieve.

It is a LEED Core and Shell Platinum building, and was designed, built and is run on a CISCO Smart Building Converged IP Network, and leverages CISCO Power-over-Ethernet (PoE) to the Edge. The building holds high sustainability practices throughout, and the Delta Controls system needed to help them meet that standard. WaterPark Place was constructed as the first large scale commercial high-rise with converged/integrated PoE LED lighting and HVAC in North America. This meant that everything would run on the IP network, rather than electrical cables. Like with any first, installing the BMS in WaterPark Place may have unforeseen challenges. There was no previous installation that Delta Controls Toronto could refer to, WaterPark Place was going to truly be the pioneer project, which is exciting and challenging at the same time.

Today's world of real-time energy monitoring and ongoing building analytics can't be maintained using traditional Building Automation System (BAS) networks. The amount of information being passed between system controllers and terminal devices requires the speed of an Ethernet connection in order to be able to keep up with the data requirements now and into the future. WaterPlace Park was one of the first buildings in North America to be built using PoE networks for the controls system.

We needed to combine power and communications into a single wire. Without having to pull electrical as well as network wiring to each controller, you could reduce your man-hours dramatically. Without needing to handle line voltage or provide stepdown transformers at each device, your materials costs can be more closely controlled. Power over Ethernet can be the answer you are looking for. Delta Controls was the first building automation manufacturer to develop a line of PoE controllers and Delta Controls Toronto were the first to install PoE in the commercial market in Toronto.

The Solution

All of these energy and control demands lead up to one thing; your BAS network needs to be able to do more. A 1 Gbps Ethernet network is ten thousand times faster than conventional MS\TP networks.

The backbone of WaterPark Place is comprised of a single converged IP network. This future proofs the building and leverages major current technology trends. Delta Controls Toronto was part of a team that integrated HVAC, lighting, access, fire, security, and CCTV systems via an Ethernet/PoE connection. There were high efficiency condensing boilers installed maximizing energy use and maintaining heating within the building. An Enwave Deep Lake Cooling system was used to bring in water from Lake Ontario for cooling systems and heat reclamation systems were installed on all ventilation units.

The Benefits

Ethernet networks for system controllers have been around for years, but only recently has there been a move to adopt Ethernet or PoE architectures on application level controllers.

Delta Controls' DVC-V322PoE controller was used for the PoE installation. It provided higher communication speeds between connected systems along with device power in a single cable. This simplifies wiring, and eliminates the need for a local control transformer, which reduced the cost of installation.

The PoE installation was much easier to manage. Compared to a traditional installation of MS/TP controllers, the PoE infrastructure allows a single source of problem solving. The building management staff can tell exactly which controller has gone down so they can pinpoint roblems for resolution.

The converged IP network meant that the BMS could monitor external daylight levels, temperature, and occupancy in real-time. By having everything run on one network, lights can be integrated with access control or heating easily providing increased personal comfort control. The Delta Controls VAV air controllers enabled CISCO to have full control over the HVAC system throughout their offices in WaterPark Place which effectively reduced energy consumption.

The Results

Usually controls engineers are the last ones to go in, but PoE changed that. WaterPark Place was unique as the IT core infrastructure needed to be established first before any systems were brought online. Prior to the curtain wall being installed, there were 300 VAV's, tested and verified, and online with temporary power during the initial construction phase of the project.

PoE connections help to connect you with your building's occupants. A connection between your building's BAS and its occupants can be achieved through devices, and the devices that the occupants have in their hands are often IP devices. The collection of data can be delivered very quickly to occupants in a format that is valuable to them and relates comfort conditions and system performance. IP infrastructure enables smarter and more responsive buildings, the CISCO building is even able to respond to individual workstation user's lighting preferences.

Overview Information

Completed in Fall 2014, WaterPark Place is a distinctive sustainable building in the City of Toronto. A LEED Platinum facility managed by Oxford Properties, it uses sustainable design to deliver a smart connected building for its occupants.

- 1 million Square Feet
- 13,200 Physical Points
- +1800 Delta PoE VAVs

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- Foreign device support
- Configuration via built-in Web server or local display

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Proximity-Based Contextual Mobility for SCADA

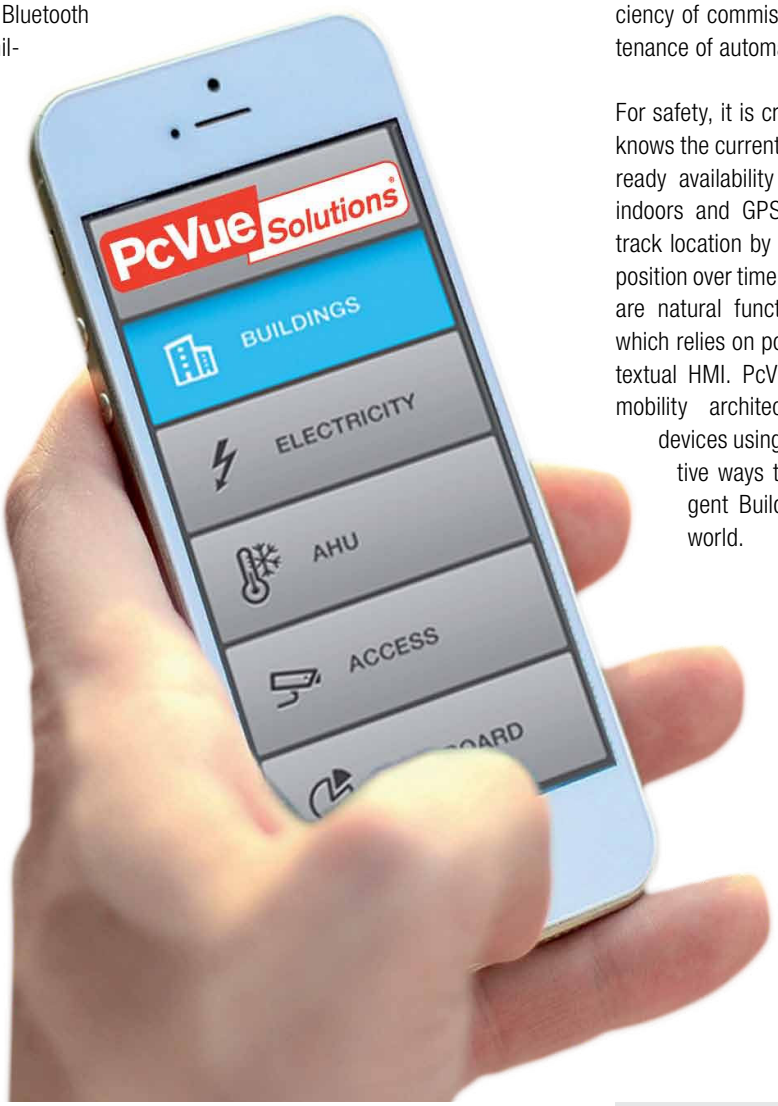
PcVue® is ARC Informatique's core product, the company is an independent provider in HMI/SCADA software. It has been contributing to the evolution of the automation industry for 30 years by providing a flexible solution for supervising building management systems, industrial processes, utilities, and infrastructure. The BTL listed PcVue Solutions are now entering an uncharted market to provide an innovative mobile offering for SCADA in intelligent buildings.

Proximity-based services enabled by micro-geolocation for Indoor Positioning Systems (IPS) are growing quickly. The IPS technology market alone is estimated to reach $5 billion in revenues by 2017 and to represent over 200,000 installations of infrastructure equipment, including Wi-Fi hotspots, Bluetooth antennas, and more than 800 million branded applications downloads.

This technology has made possible the practical deployment of contextual Human Machine Interfaces (HMI). Contextual HMI creates the opportunity for new more efficient work processes for those who rely on Supervisory Control and Data Acquisition (SCADA) and Building Management Systems (BMS) to perform their job.

Remote access to supervisory systems, have typically been accomplished by using internet browsers on laptops. With the increasing adoption of smart mobile devices, technology such as Microsoft Remote Desktop Services (RDS) has been adopted as an alternative for mobile HMI.

Navigating an HMI design-ed for a workstation while using a much smaller mobile device can prove difficult given the reduced screen size and mechanism for managing the mouse. A mobility infrastructure eliminates this problem via the presentation of information and controls in the context of role and place. It provides a dynamic HMI that change as the worker moves through workplace zones automatically adjusting for job responsibility. In a plant scenario, such a system is aware which floor a worker is on and automatically sends the status and controls of equipment in that worker's proximity. It is a very pro-active approach that is recognized to improve the efficiency of commissioning, operation and maintenance of automation systems.



For safety, it is critical that the Mobility Server knows the current location of workers. With the ready availability of geolocation signals, IPS indoors and GPS outdoors, it is possible to track location by simply archiving the device's position over time. Safety and dispatch tracking are natural functions of the Mobility Server which relies on position in order to create contextual HMI. PcVue Solutions are reinventing mobility architectures with smart mobile devices using proximity services in innovative ways to benefit SCADA and Intelligent Building projects throughout the world.

PcVue Inc. COO
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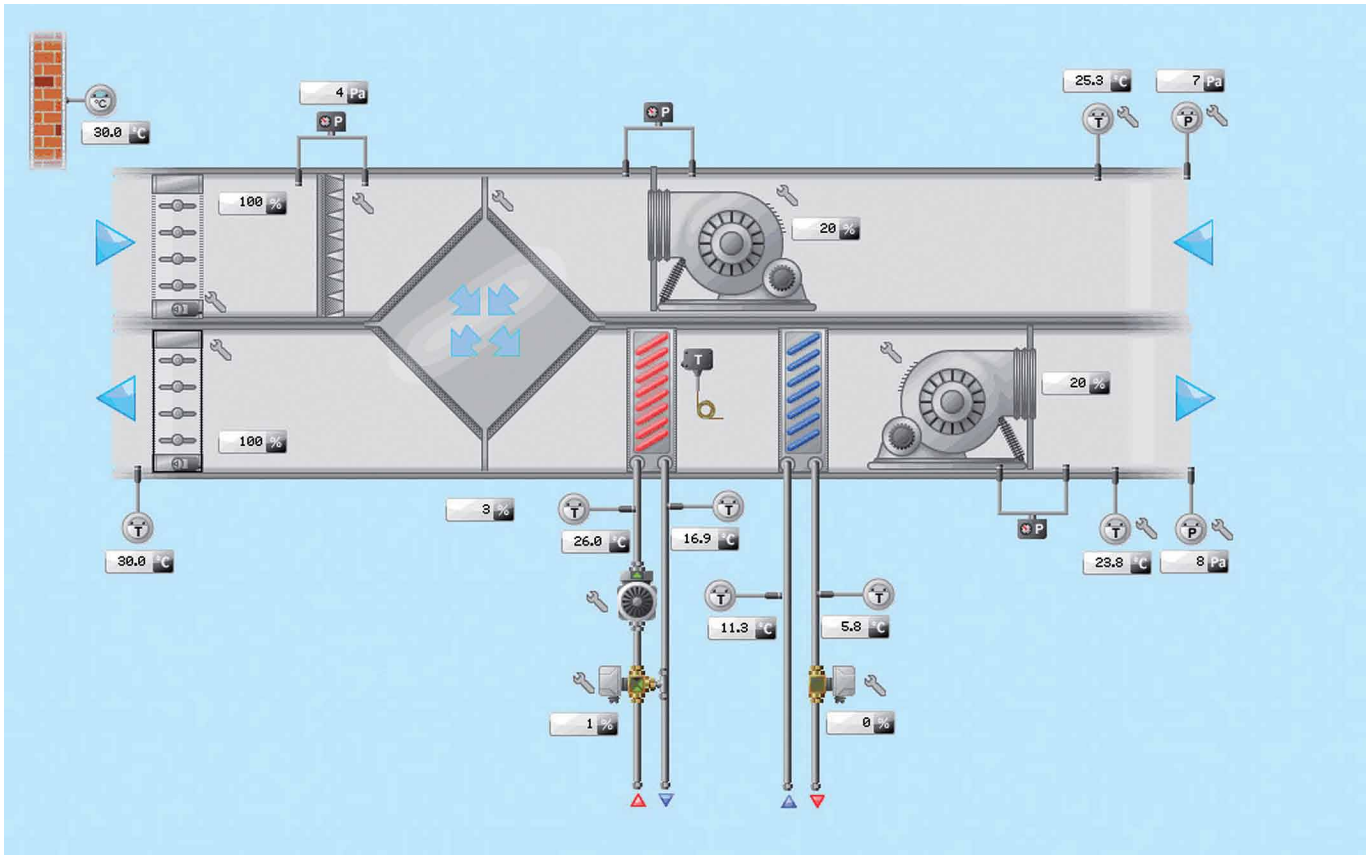
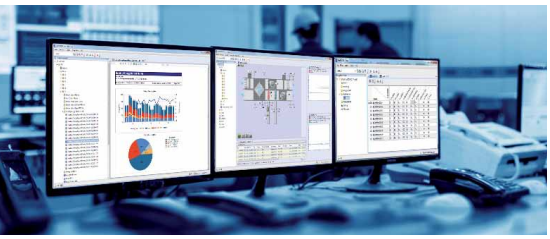


Graphical display of a ventilation system

LWEB-900 Goes BACnet

Since version 2.0, the building management software LWEB-900 is a BACnet Operator Workstation (B-OWS). In this role, LWEB-900 not only communicates with LOYTEC devices, but also with third party BACnet devices.



The LWEB-900 Building Management Software

The integrated building management software LWEB-900 provides a user interface to manage and operate a LOYTEC building management system. Information from the building can be visualized in many different ways. The various display formats are referred to as views. Views can be freely configured and optimally customized by the user.

Alarms, schedulers, trends

LWEB-900 processes BACnet alarms and displays them in the alarm view. In LWEB-900, BACnet scheduler and calendar objects and their properties can be depicted and modified. Schedulers can be hierarchically structured in the scheduler view, regardless of where they are carried out. It is thus possible to define entries that have an effect on all or only a subset of schedulers. In addition, BACnet trend log objects and their properties can be displayed and modified. Recorded data can be visualized in trend graphs or reports. What's more, LWEB-900 features a sophisticated user management system in order to define user rights.

Management of BACnet devices

BACnet devices can be easily managed by LWEB-900. The backup feature allows to define schedules for a regular backup of BACnet devices. Moreover, it is possible to reset BACnet devices or perform a time synchronization.

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BACnet – the Ideal Connection Between Hydronics and Building Automation

Modern commercial buildings should be comfortable, flexible, energy efficient and intelligent. They should also not cost more! A smart connected actuator using BACnet can help meet these requests simultaneously, by reducing time and effort for HVAC installation, commissioning and maintenance.

Today, energy efficiency is at the forefront when constructing commercial buildings, as are user comfort and flexibility, and more recently, building information, but cost and time are the limiting factors with which we plan, design and build.

It is not always necessary to invest more to save more. Smart connected products, like the NovoCon® valve actuator from Danfoss, save more than they cost, even during the construction phase. This is achieved by saving time and effort using BACnet to enable remote commissioning, remote fault finding and remote maintenance with the bonus of performance data and energy allocation. It's what Building Automation has been waiting for.

Hydronics is the Foundation

Building Automation is certainly key to achieving greater energy efficiency, but relies on hydronic field devices performing correctly.

NovoCon® S

One of those is the valve actuator, which controls the flowrate of HVAC cooling or heating water, the highest building operational cost. Responsibility for HVAC function lies with both the Hydronic Installer and the Systems Integrator. The system commands the actuators, but does not know whether the command is fulfilled.

Buildings are dynamic and HVAC demands vary with use, occupancy and weather. Most building standards only require static hydronic balance at maximum heating or cooling demand, which cannot adapt to reduced loads, which increase system pressure, causing overflows, oscillating PID loops and consequently low delta-T and lower efficiency of water chillers and boilers.

Valve actuators from Danfoss save more than they cost.

Truly pressure independent valves, like the AB-QM, have an integrated pressure regulator and provide dynamic balance automatically for all building demand conditions with a linear stroke/flow characteristic. The only influence on flow-rate is the actuator itself.

If valve pre-settings which limit power output are incorrect, control algorithms will not work. The same applies to dirt and air in the flow medium. Most SI's have seen actuators dangling from their cable next to the valve they are supposed to control, or the cable disconnected. The system cannot detect these errors, other than poor HVAC performance. Such problems can only be investigated by visiting the building, opening the ceiling and climbing a ladder to look inside. A time consuming activity and impractical if the client has already moved in.

Trouble-free remote servicing

The smart actuator knows whether it is connected to a valve, whether there are particles preventing the valve from closing and whether the control wires are connected. Fault alarms are signalled by LEDs on the actuator body and via BACnet fieldbus to the Building Automation System. Valve pre-setting is done remotely via BACnet and dirt and air can be flushed out of pipes without visiting the rooms, hundreds of valves can be fully opened for flushing in seconds. The Hydronic Installer can fit valve and actuator at the same time, without manual pre-setting. Plug-in fieldbus cables daisy-chain link actuator to actuator saving on cabling and avoiding miswiring, saving time and avoiding errors. This remote functionality reduces maintenance costs and increases flexibility for changes in building use. Automatic addressing and baud rate adaptation reduce time required by the SI.

The addition of temperature sensors on the supply and return flow combined with the accurate flow rate feedback indicates the amount of energy supplied to each room. In addition, performance data is stored in the actuator for retrieval and analysis, enabling a building's energy use to be further optimised.

Adding intelligence and BACnet to NovoCon® enables us to get more from Building Automation, saving time for the Installer, the SI and the maintenance company. Saving money for the Investor and the Building Operator.

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Using BACnet to Solve Interoperability Challenges in Fire Protection Systems

In the fire protection market, a clear leader in satisfying the industry need for interoperability is BACnet. This article will describe how BACnet solves interoperability challenges in fire protection systems.

Let's talk about the practical realities of a superior fire protection ecosystem. The goal is to create a mashup of the best devices connected to the best control panels relaying information to the best notification appliances monitored and controlled by the best graphics workstation. All the local reporting happens in the fastest, most intelligible and efficient way possible while we interface the remote stakeholders using the best wide area and distributed recipient mass notification systems. Where required, we also integrate the most intelligent smoke control, emergency lighting and security systems to assist emergency response, and this all happens in the most maintainable and cost effective way possible.

It is important to remember that every device has a set of objects, and every object has a set of properties. Various messages and services help describe the objects and their properties.

In the past, using hardwired interfaces, a collection of dry contact inputs/outputs were used to fulfill a correlation matrix to meet a specific project integration objective. Relay logic was used to design complex interfaces. Systems were poorly documented (if at all) and were nearly impossible to maintain or extend.

A BACnet client application is used to poll the life safety system and act on status changes that occur.

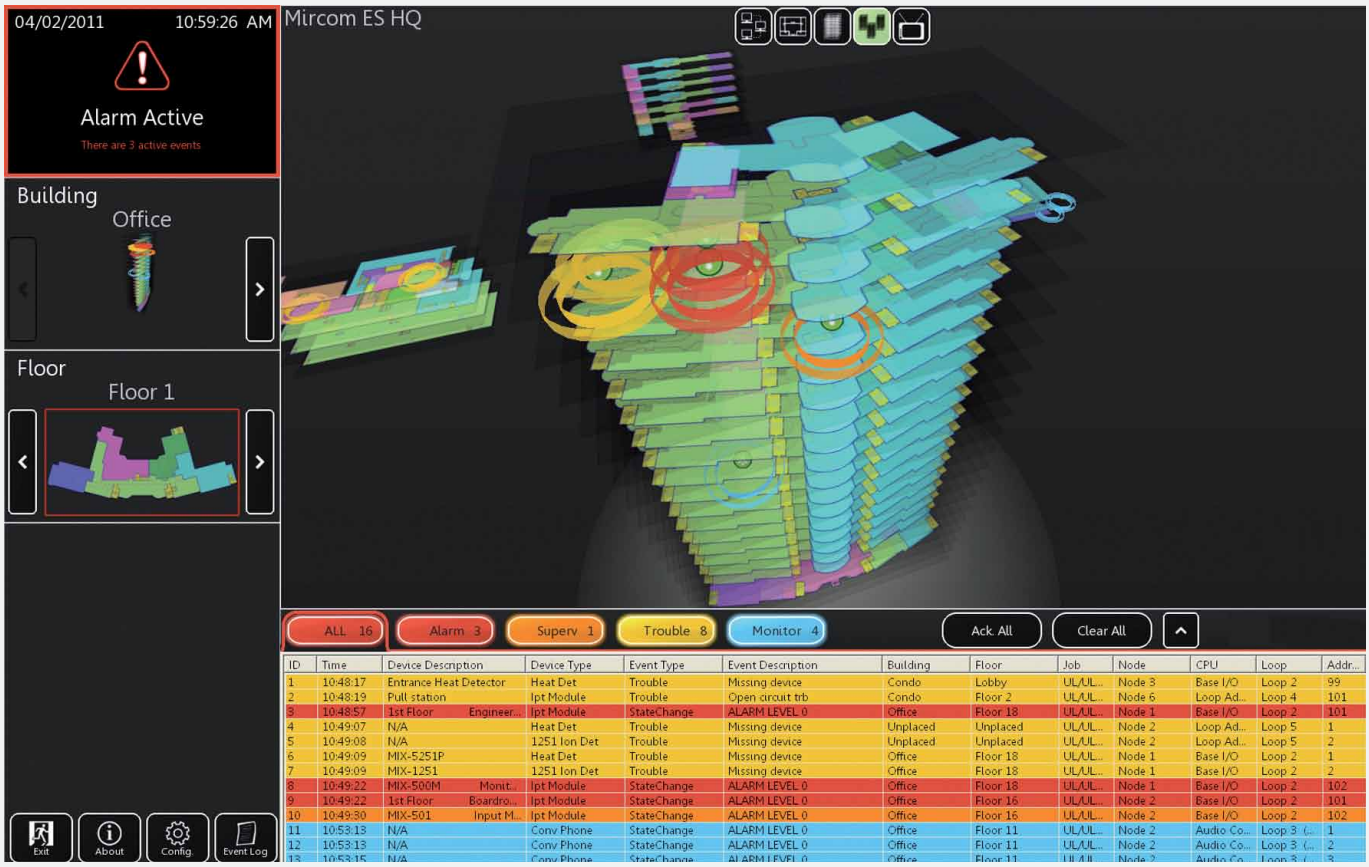
The three most important relationships for fire applications and BACnet are as follows:

1. A device represents the fire control panel or network of panels protecting a facility.
2. BACnet objects represent the sensors, input devices, and virtual statuses of faults, activations, and zone status in the monitored environment.
3. Objects change status when a sensor is activated or a zone changes status (i.e. normal to alarm).

Since BACnet and IP integrate seamlessly, BACnet itself has been adopted where IP has been adopted. The foresight in the protocol design has led to modularity in the various protocol layers which has allowed the standard and protocol to grow with the equipment it services, in a much more efficient way than MODBUS or LON ever could.

So why do those who use BACnet love it so much?

1. It's simple
2. It's effective
3. It just plain works



There should be a direct correlation between fire alarm devices such as smoke detectors and heat detectors as seen above in Mircom's OpenGN workstation to BACnet objects in a properly implemented and interoperable building management solution.

BACnet is like a common currency or clock that the rest of the world can synchronize to. It borrows and builds on the same theory that led to the computing revolution of the last 50 years. At the core of the standard, everything can be modeled as either on or off, 0 or a 1.

BACnet is built around the "Binary Input/Output Object." The simplest of concepts, it means everything we see around us is either in an "active" or "inactive" state. To add capability, each object can provide multiple properties as containers to provide further details about a physical environment, and understand the full picture at any given moment in time simply involves a computer asking and operating on the results of a defined sequence of yes or no questions, such as the following:

- Is the device powered on? Yes.
- Does the device need maintenance? No.
- Is the device in Alarm? Yes.
- Have the authorities been notified? Yes.

Being able to distill even the most complex machines into their basic constituent parts and assigning positive or negative values to each of those parts is the simplest possible way to build the full-scale models of our environments we need to achieve interoperable communications between systems.

Conclusion

Fire detection and alarm systems can easily be interfaced into BACnet workstations for building automation and building management.

ABOUT THE AUTHOR

Jason Falbo, P. Eng, M.B.A., is vice president of engineering at Mircom. In his role, Falbo is responsible for the overall management of the engineering and R&D teams, including new product development, regulatory approval and customer support for Mircom's portfolio of Intelligent Building Solutions. Founded in 1991, Mircom is a global designer, manufacturer and distributor of Intelligent Building Solutions. Reaching customers in over 100 countries worldwide, Mircom's portfolio includes: fire detection & alarm, communications & security, mass notification, nurse call, and building automation & smart technologies.

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BACnet Evolves Through Addenda

The hopes and dreams of an interoperable communications solution for the HVAC industry formally began in 1989 with the formation of SPC 135P. Six very challenging years later, ASHRAE 135-1995 – also known as BACnet – was presented to the world. At about the same time, widespread adoption of the Internet began, and Microsoft released Windows 95, its first operating system with a built-in TCP/IP stack. Coincidentally the first BACnet addendum ever published was Addendum 135-1995*a*, Annex J - BACnet/IP. To date, there have been five major updates and 58 addenda published for ASHRAE 135.

The current BACnet standard, ASHRAE 135-2012, has 12 published addenda and another five waiting to be published. There are also three addenda out for public review and quite a few proposals in the works. The SSPC 135 (Standing Standards Project Committee 135), also known as the BACnet Committee, has clearly been very busy in the last 20 years. Addenda come from the proposals presented to the BACnet Committee. These proposals can be incremental improvements proposed by the BACnet Committee itself like Addendum 135-2008*ah* which removed ReadProperty-Conditional or Addendum 135-2010*ak* that dealt with address ranges and a new serial number property.

The Solution is in BACnet

More often than not, proposals come from interested parties that may have a requirement from a customer. Or they may see a need in a market segment or maybe a change in technology has created an opportunity. In the end, the solution is in BACnet.

The trends in technology are a major driver of change within any protocol, and BACnet is no exception. Addendum 135-1995*a*, BACnet/IP, was the first of many technological based changes to the standard, and Addendum 135-2012*aj*, "IPv6 support" is the latest. The massive uptake of web-based solutions, the latest lighting technologies, the sub one dollar 32-bit microcontrollers and the potential of the Internet of Things are just a few of the many technological changes that could impact or fundamentally change how building automation systems function in the future.

In its third public review Addendum 135-2012*am*, BACnet Web Services, is the evolution of BACnet web services from a simple data exchange using SOAP to the exchange of structured data using XML or JSON. This is just one of several technology-based proposals in development.

Inclusion of Other Domains

As more customers require central monitoring and control of their systems, more domains will be included in the BACnet standard. Addendum 135-1995*c*, Life Safety objects, Addendum 135-2008*j*, Access Control objects, Addendum 135-2010*i*, Lighting Output object, and Addendum 135-2012*aq*, Elevator object, are all examples of the continued inclusion of other domains within BACnet.

Manufacturers of building automation systems produce BACnet products to meet the needs of their customers. These products may have extra non-interoperable features and capabilities requested by the customer or required by the type of facility being controlled. Making these kinds of features and requirements interoperable is another way that BACnet evolves. Today, most control systems provide some kind of alarming capability and many have sophisticated systems to manage warnings and alarms. Addendum 135-2010*af* has extended BACnet alarming to support the sophisticated alarming capabilities of today. Many facilities now require audit logging of some or all control points. The BACnet Committee has recently voted out an Audit Log addendum, so expect a public review soon. A discussion about the evolution of BACnet is not complete without discussing testing. The BACnet Committee is not only responsible for ASHRAE 135 but also ASHRAE 135.1, Method of Test for Conformance to BACnet. This standard was first published in 2003 and has seen four major updates and 16 addenda.

Tests for ASHRAE 135.1 come from either the BACnet Committee or the BACnet International supported BACnet Testing Laboratories Working Group (BTL-WG). Both the BACnet Committee and the BTL-WG produce tests for new ASHRAE 135 addenda, but the BTL-WG also updates existing tests and extends others for products in the lab. The continued evolution of tests within ASHRAE 135.1 and the value of the BTL Mark provide the confidence manufacturers, integrators and customers have in BACnet.

The quantity of work produced in the last 20 years and the number of addenda and proposals in progress is a clear indication that BACnet continues to evolve. The many sources of proposals indicate the widespread adoption of BACnet inside and outside building automation, and the ongoing adoption of new technologies indicate that BACnet has evolved for today and continues to evolve for tomorrow.

ABOUT THE AUTHOR

Michael Osborne Professional Engineer is a firmware manager at Reliable Controls Corporation where he leads a group of dedicated engineers and scientists in the development of state of the art products for the HVAC industry. As the vice chair of SSPC 135 (BACnet Committee) and MSTP-WG Convener, Osborne helps guide the ongoing evolution of BACnet.

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SUCCESS: China's BACnet Golden Week

BACnet Golden Week was held successfully Nov. 16-20 in Shenzhen, China. It was hosted by the National Technical Committee 426 on Digital Technique of Intelligent Building and Residence Community of Standardization Administration of China (SAC/TC426); supported by BACnet International, BACnet Interest Group Europe (BIG-EU), BACnet Interest Group China and Asia (BIG-CA), ASHRAE Hong Kong Chapter and ASHRAE Region XIII; and organized by the Instrumentation Technology and Economy Institute (ITEI). The event included a BACnet Forum, BACnet training and BACnet Plug Fest.

The first event, the BACnet Forum, was held on Nov. 16. The keynote speakers were: BACnet International President Andy McMillian; Chairman of ASHRAE SSPC 135 Bernhard Isler; BIG-CA Chairman Douglas Chan; Immediate Past Chairman of BACnet International Raymond Rae; ASHRAE Region XIII Chairman Edward Tsui; ASHRAE Hong Kong Chapter Chairman Dr. C S Wong; Shenzhen Intelligent City Research Association Chairman Li Lin; and ITEI Vice Chief Engineer Li Yumin. These individuals shared their experience on BACnet development in China and abroad, BACnet standard updates, the latest on BACnet application in the buildings, and BACnet testing and certification details.

The forum closed with an active Q&A session between keynote speakers and the participants. Many consider this the highlight of the event.

The second event, BACnet training, was held on Nov. 17. BACnet expert Zhou Hong was joined by Isler to instruct this event. Attendees for this training included 31 engineers from more than 10 companies related to BACnet products, as well as the Electrical and Mechanical Services Department of Hong Kong Government (EMSD-HK).

Finally, the BACnet PlugFest was held on Nov. 18 and 19. Hong was consulting this event, and the five participating companies Delta, HMS, PcVue, Shanghai Jingjie and Siemens brought the full line of BACnet devices from B-AWS to B-SS for testing. The unique offerings from this 3-in-1 event proved to be highly successful and well-received. Over 70 percent of the participants returned the forum evaluation forms, and all the trainees at the training event indicated interest for future training. Sixteen companies handed in the BIG-CA membership application for review and approval. These metrics prove that BACnet Golden Week will be something all industry professionals should have on their calendars year after year. Thank you to everyone who made this event an incredible success.

2015 Great Year for Membership Growth

It was a busy and successful year for BACnet International in 2015. The association welcomed 20 new corporate members and saw membership upgrades with three companies. This marked tremendous growth for BACnet International last year, and is certainly a positive sign of the health and strength of our collective organization.

We want to thank all of our members for supporting the association and contributing to the success of the BACnet protocol. Don't forget to check out our news room at http://www.bacnetinternational.org/news to learn more about our newest members. Additionally, you can see the most recent new members on page 26 of this publication. Here's to an even more successful 2016!

BACnet International

BACnet International Association Manager Honored

On Dec. 9, 2015, BACnet International Association Manager Natalie Nardone, CAE, CMP, was awarded the Georgia Society of Association Executives (GSAE) Skelton-Massey Award which recognizes a member who consistently and successfully supports and sponsors new members, strengthening GSAE in size and effectiveness. Nardone's impact on the people and organizations she comes in contact with is impressive. Join us in congratulating Natalie on this well-deserved award!

BTL-Listed Products Growing and Proving Critical to Interoperability

BTL Testing has continued with growth through 2015. Over 60 new applications for BTL Testing were received in 2015. This is an increase from around 30 the previous year. Additional testers were added at the BTL Reference Lab to minimize delays in testing.

The BTL (BACnet Testing Laboratories) was established by BACnet International to support compliance and interoperability testing activities, publishing BTL Listings, and grant the authorization to use the BTL Mark to successfully tested products. The BTL Listing and BTL Mark indicate that a product has successfully passed rigorous verification by testing and demonstrates that the product correctly implements rules and interoperability of the BACnet protocol. More and more product specifiers are requiring BACnet as a "must-have" for system requirements. Specification of BACnet as the protocol, and requiring BTL Listed products is becoming THE benchmark for project specifications to ensure interoperable installations. The BTL Mark may be displayed only on products that have successfully passed BTL Testing. Testing ensures that the device correctly implements all of the BACnet functionality it contains as governed by ASHRAE standard 135.1. The BTL Working Group defines the BTL Test Plan and governs the testing.

To apply for BTL Testing, please submit three forms to btl-coordinator@BACnetinternational.org: BTL Checklist, BTL Testing Application, and BTL Testing Agreement. These forms and instructions for the entire testing process may be found at: http://www.bacnetlabs.org/test_documentation under the heading BTL Test Package v14.0.

The signed BTL Testing Agreement and the $750 application fee are required to secure a place in the testing queue. The testing queue is currently around two months but may vary depending on the number and types of devices in test and the test queue. The BTL Checklist and BTL Testing Application determine which test will be performed. An application acceptance letter will be supplied that includes a formal estimate for the amount and time of testing and a test entry date. Testing fees are billed at conclusion.

BACnet International member companies at Silver level or higher received a discount on testing fees (the testing application fee is the same for all applicants). Participants may apply for testing and listing of a family of devices that share underlying BACnet software in order to minimize testing costs.

If you have any questions, please contact btl-coordinator@bacnetinternational.org.

Emily Hayes
BTL Coordinator
btl-coordinator@bacnetinternational.org

NEW BTL-LISTED PRODUCTS

(spanning approximately from the end of July 2015 until early December 2015)

Trend
- IQ4
- IQ4NC

PCVue
- 11.2 OWS
- 11.2 AWS

Reliable
- SSCE

HNW
- MEKiD1
- HT9631
- DDC-28P

SAUTER
- ecos301
- modu5xx

Grundfos
- CIM500

TCS Basys
- UbiquiStat

Kamstrup
- MULTICAL-6L2

Siemens
- MODBAC
- Desigo-Insight
- DESIGO PXC3
- PXC16/24
- TC16/24
- TC and PXC

Shina SiBAS
- HMI Software Series

JCI
- NAE
- NCE
- NIE
- Smart Connected Chiller
- Facility Explorer
- Metasys, VAV Modular Assemblies
- Network Control Engine
- Network Integration Engine
- Network Automation Engine

Azbil
- savic-net™

ABB
- ACQ550
- ACS355

Reliable
- RC WebView® 3

MACH-ProCom/Sys
- MACH-ProWebCom/Sys

Dwyer
- AVUL

ABRegin
- 283DW-3

Emerson
- Liebert® IntelliSlot® Unity Card

Tridium
- VT9631

Delta
- enteliZONE
- enteliBUS
- eBMGR-TCH

Honeywell
- Stryker BACnet VAV

Tekmar
- Intelli-Station
- 680

Veris
- Enercept Flex

Carrier
- SystemVu

Onicon
- BTU Meter

Gagyo
- BEN-MMI-Management-OWS
- BEN-MMI-Management-AWS
- SmartBEN Controller

Elesta
- Controlesta RCO D

Distech
- ECY-S1000

Innotech
- Omni BEMS Controller Family

Danfoss
- FC-102

Wattmaster
- DDC Controller

Toshiba
- BN Interface

New to the BACnet International Family

Member of BACnet International

BACnet International is the global 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 proud to welcome the following new members to BACnet International.

Silver Members

Critical Room Control

Critical Room Control is a single source design and manufacturer of superior critical environment airflow monitoring and control systems for the medical, laboratory, and life science community. The company is known for its ability to integrate solutions into an easy to use management system. Critical Room Control prides itself on developing and using the latest technology to create a safer and more efficient working environment. The company's mission is to develop new products, incorporating the latest technologies to create a safe and efficient working environment.

2025 Lavoisier no 135
Quebec, Quebec G1N 4L6
Canada

Computrols

Computrols is a privately held corporation based in New Orleans, La. Computrols designs, manufactures and services state-of-the-art building automation systems throughout the U.S. and abroad. With over 25 years in the industry, Computrols has established a solid reputation as a leader in automation systems for large facilities. High-rise office towers, military bases, hospitals, schools and government monuments across the United States and the world benefit from the power, simplicity, and reliability of Computrols building automation products. Through its branch offices and dealer network, Computrols continues to grow its customer base and distribution channels, as well as expand its product line into new markets.

221 Bark Drive, Building C-5
Harvey, LA 70058
United States

Dwyer Instruments Inc.

Dwyer Instruments Inc. is a global leader in designing and manufacturing innovative Controls, Sensors and Instrumentation solutions to the HVAC and Process Automation markets. Dwyer works tirelessly to get it right. That's why the company holds over 650 technical patents and that number grows every year. They are an enthusiastic group of people headquartered in Michigan City, Indiana with satellite locations around the globe. Dwyer takes great pride in the intellect and integrity of its employees who are passionate about the work they do, the products they develop and the industries they serve.

102 Indiana Hwy 212
Michigan City IN 46360
United States

Emerson Network Power

Emerson Network Power is the world's leading provider of critical infrastructure technologies and life cycle services for information and communications technology systems. With an expansive portfolio of intelligent, rapidly deployable hardware and software solutions for power, thermal and infrastructure management, Emerson enables efficient, highly available networks.

975 Pittsburgh Drive
Delaware, OH 43015
United States

Flexim

As a technology leader in the field of clamp-on ultrasonic flow measurement, FLEXIM offers ideal flow metering solutions - even for the most demanding challenges. Whether dealing with liquids or gases, extreme temperatures, high pressures or highly variable flow rates in thick walled pipes, the company's range of FLUXUS flow meters are the measurement system of choice. With more than 20 years of engineering experience, FLEXIM also offers solutions for a real time concentration analysis with laboratory accuracy. Depending on the individual application, PIOX analyses the process by ultrasound or optically by measuring the refractive index.

250-V Executive Drive
Edgewood, NY 11717
United States

Functional Devices

Functional Devices, Inc. has been designing and manufacturing quality electronic devices in the United States of America since 1969. The company's goal is to provide high quality products for the most reliable and economical solutions to the needs of its customers, along with world-class support from its sales and engineering experts. Current product offerings include relays, current sensors, power control, enclosures, power supplies, transformers and accessories. Functional Devices has established itself as a leader in the HVAC, Building Controls, Energy Management, Energy Savings, Lighting Controls and Wireless industries.

1101 Commerce Dr
Sharpsville, IN, 46068
United States

GagyoTech Co., Ltd & Laboratory

GagyoTech, which specializes in research and development, was founded in January 2002 with nine years experience in the field of eco-friendly products. The company is known for its pioneering, data-center environmental control, and super-computer cooling. It is also involved in construction management of engineering facilities and other various types of buildings. Recognition by the Air Conditioning Institute of Technology in 2005 established us as a leader in developing low-carbon/green growth systems and products such as plastic heat exchangers, ventilation equipment and ice storage systems. GagyoTech is committed to developing new energy technologies of the future.

1 Floor Seungeun Building 490-11
Gung-dong, Yuseong-go, Deajeon
Korea

GD Midea Heating & Ventilating

Since being established in 1968, Midea has grown from what was once a local workshop into a leading consumer appliances and heating, ventilation and air-conditioning (HVAC) systems manufacturer, with operations around the world. Forty years of persistent growth has brought its global turnover to US $23 billion in 2014. Consequently, Midea has over 126,000 employees in China and throughout the world. Midea wields a comprehensive product portfolio and vast production capacity to meet these demands. Midea's integrated research and manufacturing process helps to enrich lifestyles worldwide through a distinct range of innovative, yet affordable products.

No. 6 Midea Avenue
Beijiao, Shunde, Foshan City, Guangdong Province, P.R.
China 528311

Industrial Controls Communications, Inc.

Industrial Control Communications specializes in the engineering and manufacturing of stand-alone and embedded communication and control solutions for factory automation, networked controls, and building automation systems. The company's products provide connectivity to Industrial Ethernet and fieldbus networks for the Industrial and Commercial Markets. In addition to developing our line of products, ICC can customize products for your needs. The company has been committed to providing reasonably priced, high quality connectivity solutions since 1997.

1600 Aspen Commons, Suite 210
Middleton, WI 53562-4720
United States

Intermatic Incorporated

From a time when the world was a simpler place to today's high-tech revolution, Intermatic products have brought solutions, big and small, to contractors, OEMs, facility managers and homeowners. The company's core values, quality, reliability and affordability never go out of style. With more Intermatic controls installed in North America than any other brand, Intermatic products will continue to serve our customers with quality performance and energy efficient solutions.

7777 Winn Rd
Spring Grove, IL 60081
United States

Isoil Industria Spa

ISOIL INDUSTRIA, founded in 1958, is an Italian Company focused on meeting the customer's needs thanks to the applications know-how and competence in flow measurement and data management, with full design and manufacturing facilities in Italy. ISOMAG® Electromagnetic Flowmeter line is, above all, the most important product line within ISOIL INDUSTRIA. Through its lines ISOMAG® Electromagnetic Flow Meters, ISOFLUXTM Ultrasonic Flow Meters, ISONRGTM Heat Meters and ISOD@MTM Data Management software Isoil offers a wide range of solutions for Water, Waste Water, HVAC and Industrial applications.

Via F.lli Gracchi, 27 - 20092 Cinisello Balsamo
Milano 20092
Italy

Onicon

ONICON Incorporated has been in the flow measurement and hydronic energy business since 1987. Headquartered in Clearwater, FL, ONICON designs and manufactures a full line of highly accurate flow meters and energy measurement systems. Onicon's wide range of products includes turbine, vortex, electromagnetic, thermal mass, and clamp-on ultrasonic meters as well as BTU meters and display modules. Together, the company's broad and competitively priced product suite continually provides their customers comprehensive options for their flow measurement requirements.

11451 Belcher Road South
Largo FL 33773
United States

Calendar of BACnet International Events

Dates 2016	Event	Location
January 21	BTL Working Group Meeting	Orlando, FL, USA
January 22 – 26	SSPC Meetings	Orlando, FL, USA
January 25 – 27	AHR Expo 2016 – Visit BACnet International in Booth 1042	Orlando, FL, USA
March 22 – 24	NFMT Baltimore	Baltimore, MD, USA
April 17	BTL Working Group Meeting	Plantation, FL, USA
April 18 – 22	SSPC Meetings	Plantation, FL, USA
April 24 – 28	LIGHTFAIR International	San Diego, CA, USA
May 3	NFMT High-Performance Buildings & Workplaces	Austin, Texas, USA
June 22 – 23	IBCon 2016	San Jose, CA, USA
September 21 – 23	WEEC, World Energy Engineering Congress	Washington, DC, USA
September 25 – 29	PlugFest 2016	Durham, NH, USA

Information about all events: David Nardone, BACnet International: david@bacnetinternational.org or at www.bacnetinternational.org

BACnet International Journal 11

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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