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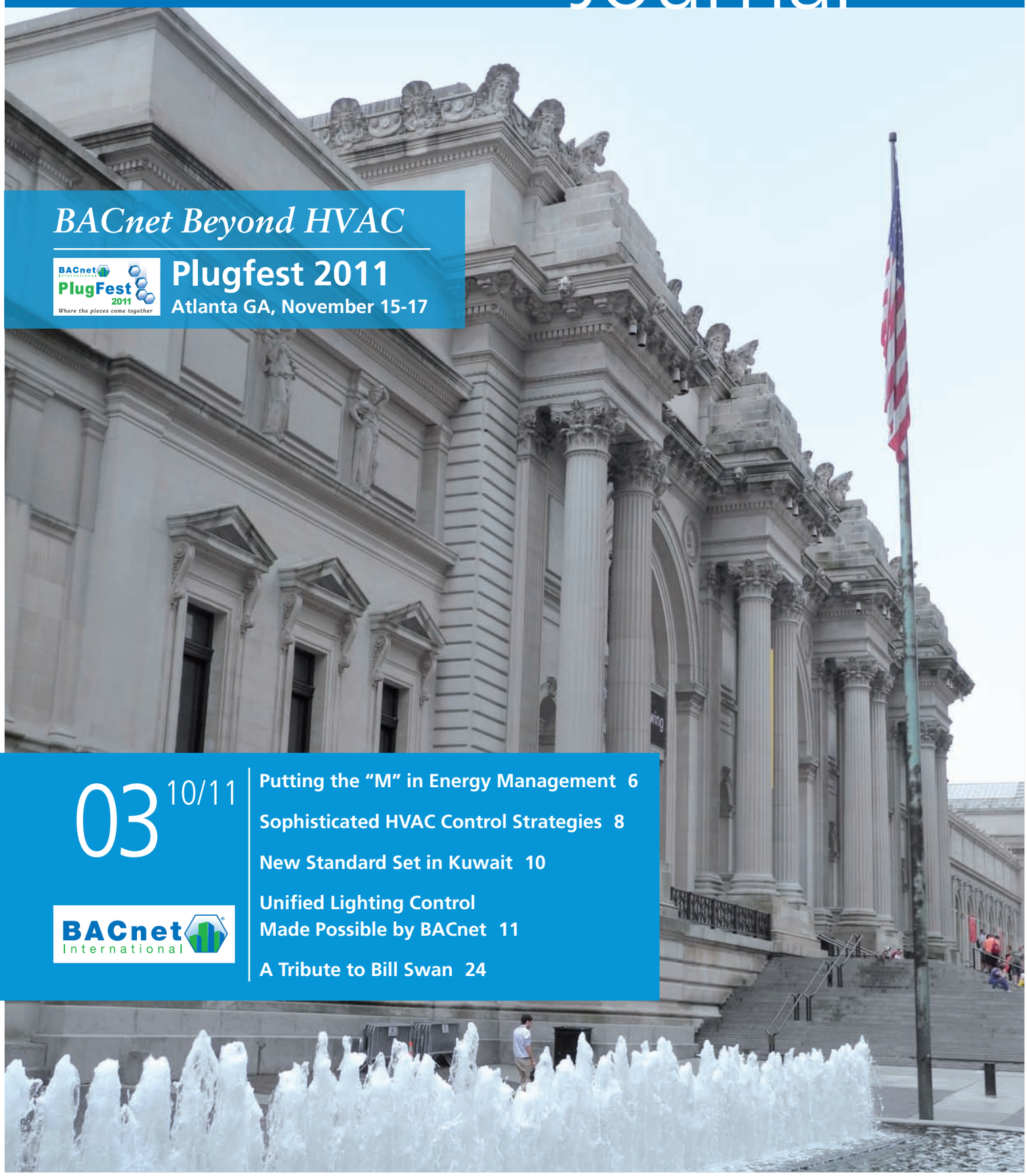
The BACnet magazine for building automation



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BACnet International

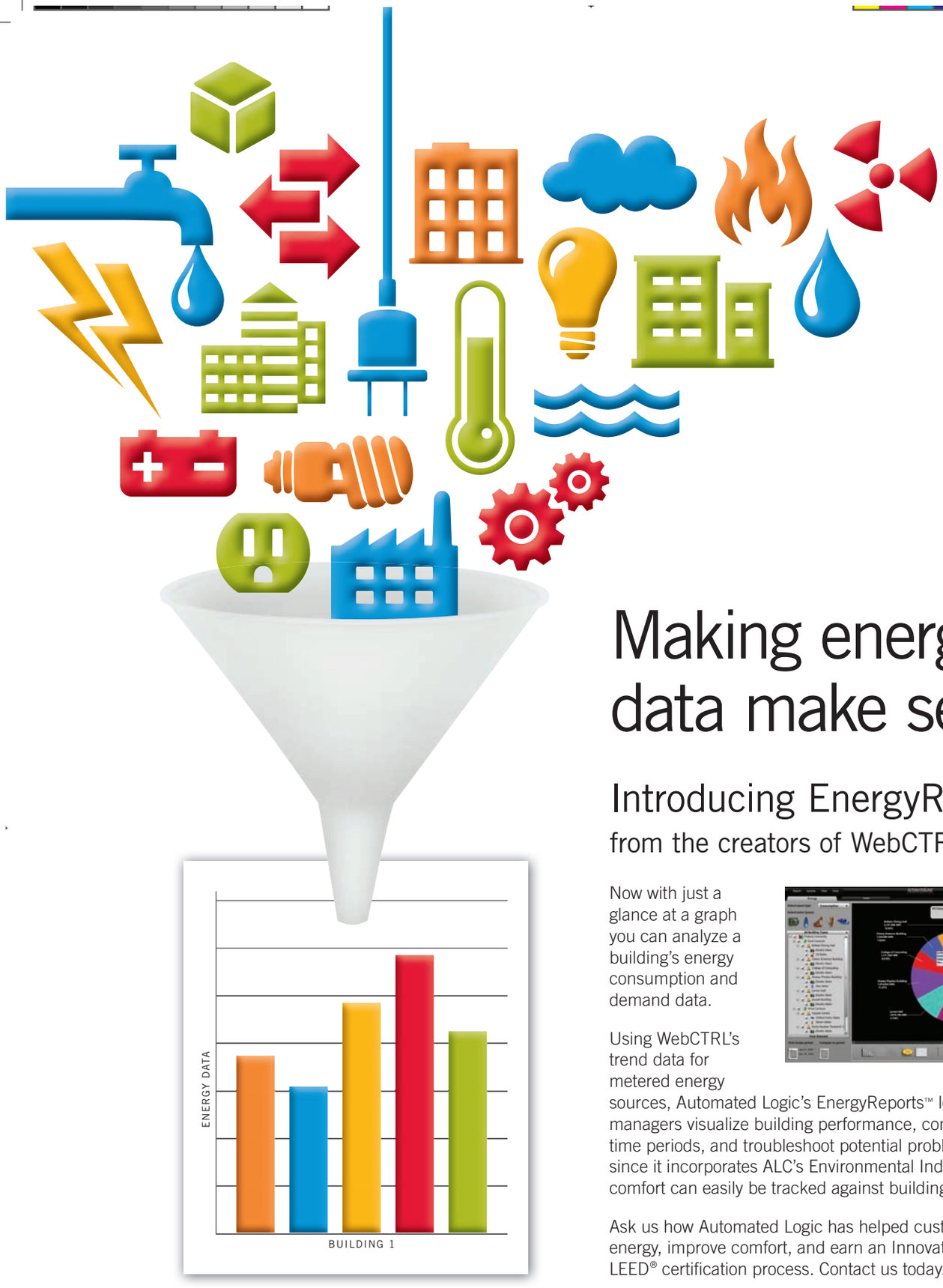
Putting the "M" in Energy Management 6

Sophisticated HVAC Control Strategies 8

New Standard Set in Kuwait 10

Unified Lighting Control Made Possible by BACnet 11

A Tribute to Bill Swan 24



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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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Content

5 BACnet – An American Standard, but so Much More

Solutions

6 Putting the "M" in Energy Management

7 BACnet International is the Cornerstone of Your Success

8 Sophisticated HVAC Control Strategies – ImaginOn: The Joe and Joan Martin Center

10 New Standard Set for Integration of Systems in Kuwait

11 Unified Lighting Control Made Possible by BACnet

BACnet insight

12 BTL-WG Introduces New BTL Test Plan 9.0

15 ASHRAE SSPC-135 Meetings – BACnet Proceedings

Products

16 Microprocessor-based Controller to Broaden its New Standard

16 Native BACnet MS/TP Power and Energy Meter

BACnet International News

17 Banner Year for New BTL Listed Products

18 Why go BTL?

19 First Swan Award Presented to Bernhard Isler

20 Hot Spot in Vegas – BACnet International Booth

21 Get Plugged In at PlugFest 2011

22 Showcase Your BACnet Success

23 Welcome to the BACnet International Family

24 A Tribute to Bill Swan

26 A Brief History of BACnet

Cover Picture

Metropolitan Museum of Arts
New York city, prominent showcase of BACnet successes

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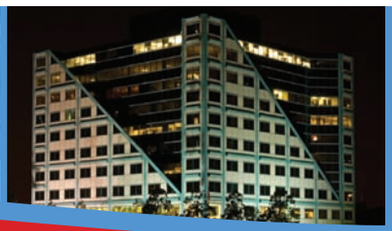

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BACnet – An American Standard, but so Much More

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The tremendous success of BACnet in the worldwide building automation market is not simply the result of good luck or fortunate timing. It is the result of countless hours of hard work by dedicated industry experts who have come to share a common vision and a process that enables effective collaboration. Formal standardization efforts have a reputation for being slow, bureaucratic, and difficult for outsiders to understand or influence. Because of that widely held view, it may come as a surprise that the standardization process has been key to both the technical quality and the wide acceptance of BACnet in the marketplace, but it is true.

The focal point for maintaining BACnet is a standing committee in the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) known as Standing Standard Project Committee 135 (SSPC 135). Even though ASHRAE is an American society and develops American national standards, in practice the process is international in character. The meetings of SSPC 135 are open to any interested person and, if you attend one, you will find participants from throughout North America, Europe, Asia, and sometimes other parts of the world as well. Most of the people in the room will not even be formal members of the committee, but that makes no difference. SSPC 135 maintains formal International Organizational Liaisons to help foster and encourage this international participation.

There is a formal continuous maintenance process that enables anyone to submit "change proposals" to SSPC 135 through the ASHRAE website. Sometimes that happens, but it is much more common for new ideas to come through direct participation. People simply show up at some meetings, learn how the committee works, and then begin to engage with their own ideas and contributions.

The home for the international version of BACnet (ISO 16484-5) is ISO Technical Committee 205, Building Environment Design. This international standard is adopted by many countries as a national standard. Although ISO is not bound by the American process, special procedures have been put in place to expedite international approval of changes that come from ASHRAE. Any proposed changes to BACnet are first submitted to SSPC 135 for consideration. Why would an international committee act in this way? It is because there is great confidence in both the openness and fairness of the ASHRAE process.

BACnet works because of the dedication and quality of the people involved in maintaining the standard. It is embraced around the world because its contributors come from all over the world and the process creates a collegial atmosphere that welcomes all comers.

Putting the "M" in Energy Management

The term "Energy Management" is all over the place these days. You can hardly open a magazine, peruse a conference agenda or review a product announcement without coming across it. I suppose all this could be driven by the huge amount of government money focused on energy projects or maybe it's a response to the growing building owner/operator focus on energy costs, sustainability and carbon footprints. Or, it could just be that energy is the current "next big thing" much like "the web" was in the late nineties and biotech was a few years back. Whatever the reason, it seems more and more people are climbing on the Energy Management bandwagon but not everyone understands what it really means. Some people seem to equate Energy Efficiency with Energy Management.

There are lots of formal definitions of "Management" but in general I think we can say it includes three elements. To make it simple, let's call them the "three I's" – Information, Intelligence and Influence. To effectively manage anything, we need information about the current situation and perhaps information about the past. We also need intelligence to interpret the information, balance competing objectives, consider alternate courses of action, assess the likely outcome of each action and make a decision. Finally, to effectively manage we need the ability to directly or indirectly influence the situation. So, let's look at each of these in the context of energy management and explore how BACnet enables practical implementation of each.

Information

Energy management in commercial buildings requires information on both energy efficiency and energy effectiveness. At a high level the first one is pretty clear. We need to know how much energy the building uses as conditions change and system parameters are adjusted. We can get this information through direct measurement. For example, we can measure the power consumption of the HVAC system in a building as the outdoor temperature varies and the internal temperature setpoints change. Of course, gathering data from an HVAC control system is not sufficient. We also need to gather information from lighting control systems, power monitoring systems and perhaps refrigeration systems. And for many buildings today we need to go beyond energy consumption information. We also need to gather information from on-site power generation systems in buildings where they exist. Gathering and integrating information from so many building systems used to require unique design skills and prohibitively expensive custom software. BACnet has dramatically changed that equation. With built-in functionality for sophisticated data collection and event management, BACnet reduces the overall design time and lowers the life-cycle cost of building-wide information collection and management.

The second information component, energy effectiveness, is a measure of how well the use of energy is balanced with other building owner/operator objectives including occupant comfort, productivity and security. Unfortunately, energy effectiveness is not easy to measure. BACnet cannot help where no measurement method exists; however it is worth noting that the continuous evolution of BACnet ensures systems will be able to incorporate whatever measures are eventually developed. Whether effectiveness measures eventually come from advanced sensors, non-traditional building subsystems, enterprise applications or simply user data entry, BACnet has the ability to connect to the source and integrate the information.

Intelligence

The intelligence component of energy management can be provided by knowledgeable facility staff and/or computer software that reflects many years of building operations experience. In either case, the point of intelligence is to analyze the information available and decide on a course of action that will balance effectiveness and efficiency. Of course, effective information analysis depends on being able to access all the relevant data. The balance has to take into account the nature of the building and the characteristics of its usage. For example, in a retail store the optimum environment is a mission-critical issue since an uncomfortable shopper has many other choices of shopping venue. In an office building there may be more latitude on the comfort objective in pursuit of lower energy usage. For cases where the system intelligence is provided by operators, BACnet specifies a variety of Operator Workstations profiles to ensure that diverse users have the appropriate tools for their task. When system intelligence takes the form of a software application, BACnet provides a web services interface to allow standard mechanisms for communicating the required information to the application. In both cases, BACnet enables the intelligence component of "management" to effectively integrate with the information component.

Influence

Influencing the use of energy is the third component of energy management and it relies on the ability to command and control a variety of building systems. Influence is exercised through changes in operating parameters such as

temperature setpoints, fan operating modes, light levels and equipment schedules. This final link in energy management can be accomplished locally through user interfaces or remotely through a networked connection. Regardless of how it is handled, actually changing the system in response to intelligent analysis of relevant information is an essential component of energy management. And the influence component cannot realistically be achieved without connectivity both within building subsystems (such as HVAC, Lighting, etc.) and among building subsystems. Making that level of integration practical is the key benefit of a BACnet solution.

With the "three I's" in mind we can see that an energy efficiency project is not the same thing as an energy management project. Upgrading lighting, going to higher SEER systems and relocating thermostats may well improve energy efficiency, but these activities lack the information and intelligence aspects of true energy management.

Systems that collect data on power consumption and environmental variables and post them on a website are not really performing energy management, either. Although it is possible someone will look at the website and on the basis of what they see make some decisions and change the building operating parameters accordingly, I think most people think the Intelligence and Influence parts of the energy management equation must be a little more automated than that.

Summary

The "M" in energy management is the hard part of the system. Building controls have been around for a long time and are not a significant challenge anymore. Databases, web interfaces and tools for turning lots of data in colorful charts are all pretty easy to manage, too. On the other hand, it takes broad, multilevel system integration to collect all of the relevant Information, make it visible to people and software applications for Intelligent analysis and enable effective action to Influence the energy consumption going forward. These are the essence of the "M" in energy management and they are critical to getting long-term benefit. Enabling systems that are integrated enough to accomplish the "M" in energy management is what BACnet is all about.

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BACnet International followers benefit from an electronic monthly publication called Cornerstones, which is free to subscribe to. This publication is open to all members of the BACnet community, connecting corporate, integrator, site, developer, student and individual end-users. Cornerstones provides a realm of content ranging from features on new products released by BACnet International member companies to Success Stories (case studies) to promotional opportunities to educational resources. Cornerstones is a unique publication in that we speak not only to engineering and contractor communities, but also to the facility professionals, managers, owners and beyond.

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Envision for BACtalk™ front-end software manages all functions and integrates third-party systems including lighting control and fire/life safety.

Sophisticated HVAC Control Strategies – ImaginOn: The Joe and Joan Martin Center

Public Library of Charlotte & Mecklenburg County and Children's Theatre of Charlotte, each offered engaging and educational children's programs, but were low on space. Executive directors decided on a combined solution in a single, new facility.

ALERTON®

An Alerton BACnet-based energy management system (EMS) provides energy efficient operation, including occupancy-based HVAC control. Alerton's Envision for BACtalk™ front-end software manages all functions and integrates third-party systems including lighting control and fire/life safety.

Sophisticated control strategies – including supply air reset control, static pressure reset control, and fan speed modulation based on airflow measuring – effectively manage the vastly different heating and cooling needs of the library and theater. In addition to motion-based space sensors, precision controls reduce energy use and increase savings by ensuring no space is over- or under-ventilated.

An analog output on an Alerton unitary control-

Precision controls reduce energy use and increase savings by ensuring no space is over or under ventilated.

ler uses an electronically commutated motor (ECM) speed card to control VAV box fan speed and reduce ImaginOn's energy consumption.

Controls contractor Hoffman Building Technologies established interfaces to a packaged Bell & Gosset pumping system for secondary chilled and hot water systems. Piping is classic constant volume primary and variable volume secondary with differential pressure control. Onicon BTU meters are in the hot water and chilled water systems for energy measurement and verification (M&V). Meters are connected to the EMS, and energy consumption is trended for analysis.

LEED certification

To help ImaginOn achieve LEED certification, building data had to be vigilantly tracked and verified. Integrated York chillers use an MS/TP trunk off an Alerton global controller, picking up 40–50 points and enabling the trunk to generate substantial data. An integrated lighting control panel energizes zone lighting once it picks up an occupancy sensor contact. For additional control, an Alerton Microtouch offers a push-button override option if the motion sensor misses the contact. CO_2 demand control ventilation (DCV), which controls the outdoor air intake, enables the EMS to reduce the chance of over-ventilating during low occupancy. The system still provides enough outdoor air ventilation, but decreases energy consumption in doing so.

Another project requirement was for the controls contractor to provide power to the combination fire-smoke dampers. The fire alarm contractor provided a contact and a p-tap station for each damper. Hoffman coordinated the fire alarm and smoke alarm contractors in placing and concealing power transformers that power the fire-smoke dampers and complete installation.

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New Standard Set for Integration of Systems in Kuwait

Kuwait Oil Company (KOC), a subsidiary of state-owned Kuwait Petroleum Corporation, is universally recognized as one of the world's top oil energy producing enterprises. Pumping around 2.3 million barrels of oil per day, and controlling nearly a tenth of global oil reserves, the company is the fourth largest producer in the OPEC oil cartel. KOC's operations under KPC's umbrella include the exploration, drilling, and production of oil and gas within the State of Kuwait. Additionally, the company is also involved in the storage of crude oil and delivery to tankers for export.

To help oversee and manage the company's increasing oil interests KOC initiated the construction of its new headquarters at the start of 2007 in the industrial area of Ahmadi City. Ahmadi City is a private preserve in Al Ahmadi Kuwait built by KOC for its employees–complete with elegant residential buildings, parks, mosques, schools, sports centers, theaters, and many other facilities vital to any reasonable residential settlement.

Designed by Gulf Consulting Group and constructed by Alimeah Building Company of Kuwait, the new KOC headquarters consist of six main office buildings and four support buildings that span across twelve acres of land. With over 600,000 square feet of conditioned space, over 15,000 physically connected points, and a total cost of over $182.5 million, the project represents one of the larger KMC Controls installations worldwide.

To satisfy the strict criteria for the new office complex, Kuwait Computer Services, a local KMC Controls authorized representative, installed KMC's latest building automation system solutions. The KMC system totally integrates the IT and BAS infrastructure which includes the facility management control system and multiple subsystems such as building management, fire alarm, and access control with closed circuit television (CCTV).

With over 600,000 square feet of conditioned space the project represents one of the larger KMC Controls installations worldwide.

To help oversee and manage the company's increasing oil interests KOC initiated the construction of its new headquarters.

Management of the system

System management is achieved through a 100Mbps Ethernet backbone integrated with the owner's intelligent building network. This is the foundation that handles the high-speed network and its connected devices. KMC's state-of-the-art TotalControl web-based workstation is networked to 19 operator workstations and provides for the seamless integration of all systems information and "one click" operation for the entire graphics interface. It is possible from a FMCS workstation to control one of 176 CCTV cameras, over 100 controlled doors, or any mechanical and electrical load such as an AHU or VAV zone.

The integrated systems package is an ideal solution for today's sophisticated facilities and serves as another powerful statement of how the company is committed to preserving the quality of their employee's health, safety, and surrounding environments. Kuwait Oil Company, in partnership with Kuwait Computer Services and KMC Controls, has set a new standard for the integration of various systems and independent protocols into a manageable and operational network. ■

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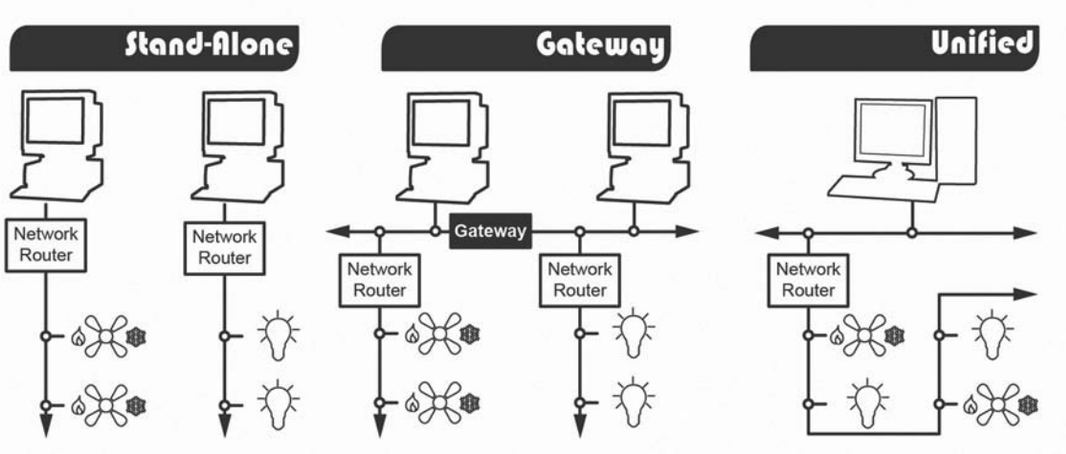
Unified Lighting Control Made Possible by BACnet

Before BACnet and its global adoption, integrating lighting and HVAC controls within the Building Automation System (BAS) was expensive and uncertain. Because the risks and costs associated with pre-BACnet integration did not outweigh the benefits, most engineers and owners were forced to settle for stand-alone systems. The results of the past are clear; according to industry surveys less than 10 % of existing BAS include the control of lighting.

Today, with BACnet, consistently integrating lighting and HVAC together inside a BAS is easy. BACnet lighting control is native to the BAS, residing on the same BACnet MS/TP network as the HVAC/DDC controllers. The result is unified lighting control that delivers substantial infrastructure and maintenance savings, as well as better energy savings.



Unified lighting control eliminates the complexities and limitations that accompany stand-alone or gateway lighting control.

Better energy savings

U.S. Department of Energy data indicates that light and HVAC consume over 60 % of the energy in commercial buildings. Both stand-alone and unified lighting control can achieve basic energy savings and typically payback in less than 3 years. Unlike stand-alone, unified lighting control can employ more advanced control sequences to achieve better savings, often accomplished through simple programming changes.

One example being employed is extending the use of occupancy sensors to automatically control lights and HVAC in unoccupied classrooms. For example; when an area goes unoccupied and the BAS is in occupied mode the lights automatically switch off and the temperature is changed to its reset value. Depending upon the application, additional energy saving measures can be taken by decreasing airflow or deciding to bring in less outside air.

Common classroom complaints with occupancy sensors can also be addressed by utilizing the BAS mode, occupied or unoccupied, to automatically adjust occupancy sensors time-out values. Increasing the value when the BAS is in occupied mode can reduce false-off complaints, while decreasing the value in the unoccupied mode can lower energy usage.

In addition, classrooms can employ a manual-on control strategy for lighting and HVAC to save energy between the occupied start time of the BAS, and the time when the room is actually occupied. Instead of the lights switching on at 6am when the BAS changes to occupied mode, activation of the override switch turns the lights on and initiates a temperature change from reset to set point.

The bottom line

Enabled by BACnet, unified lighting control provides better energy savings and it eliminates the complexities and limitations that accompany stand-alone or gateway lighting control. Compared to the choices of the past unified lighting control is a no-brainer.

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BTL-WG Introduces New BTL Test Plan 9.0

Frank Schubert [1]

Introduction

As a communication standard BACnet is flexible to allow implementers different options and levels of functionality. Looking only to controllers BACnet introduces 5 different device profiles. From smart sensors or actuators (very small devices in functionality) up to building controllers supporting alarming, scheduling, trending and device management different devices may support different parts and functions of the BACnet standard.

Assuring the best possible interoperability is the main task for the BTL-WG (BACnet Testing Laboratories Working Group). This group of volunteers from different international countries including Europe maintains the BTL-test plan, develops interoperability guidelines and helps clarify issues found in testing BACnet devices. BTL-WG is a group under the head of BACnet International.

Conformance vs. Interoperability

Interoperability means that two or more devices understand each other on the same functional basis. Conformance means that devices behave as expected according to the standard/norm. To assure the best possible interoperability all devices must first be conform to the standard. Assuming two devices violating the standard but in the same way would still allow interoperability between these two, but if a third device conforming to the standard tries to connect it may fail.

So only both, conformance as the first step and interoperability as the second step, assures that all devices understand each other.

New guidelines for interoperability

Together with the BTL-test plan 9 the BTL-WG introduces an updated release of the BTL Implementation Guidelines. This document containing recommendations on how to implement certain BACnet functionality may be used by manufacturers as "good practice" examples to assure an interoperable implementation. The document can be downloaded for free from the BTL-WG website.

The document is also intended to avoid mistakes in implementations which may be made in earlier devices. So the guidelines help newcomers to follow the right path implementing BACnet.

Overview about the testing process

For all pre-testers it is recommended to carefully read the two documents "BTL Getting started" and "BTL testing guide". Both documents are part of the test package.

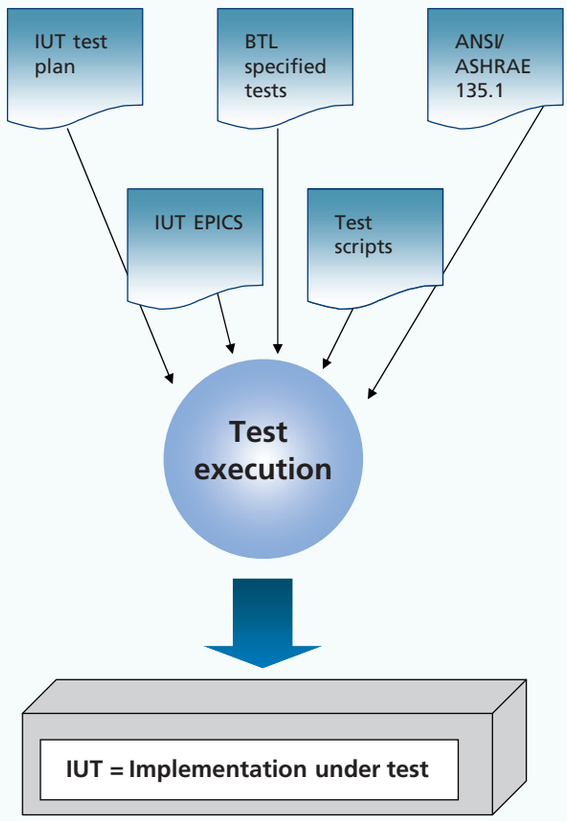
Picture 1 shows a rough overview about the related documents and testing process.

IUT test plan: From the total functionality which can is covered by the test plan, the pre-tester selects those which apply to the IUT (Implementation under test) and fills out the so-called IUT-functionality checklist. If e.g. the device does not support ReadPropertyMultiple, this cannot be part of the testing of course. So all supported functionality of the IUT applies to the test process.

ANSI/ASHRAE 135.1 (ISO 16484-6): This document contains the test instructions to test a certain functionality. The tests are described in a pseudo-language. Test instructions may be for example: MAKE "The IUT send an alarm", "WRITE Object X, OutofService=TRUE", CHECK "the IUT did not restart", etc.

BTL specified tests: In case tests from 135.1 are broken or need to be more precise BTL introduces BTL specified tests as an interims approach to bridge the gap. The BTL specified tests are later given to the SSPC TI-WG (Testing and Interoperability Working Group of the Standing Standard Project Committee).

IUT EPICS: To let the tester and the test software know about the current content of the IUT the entire database of the device is described in the electronic format of the PICS (protocol implementation conformance statement). This is necessary to have reliable information about the IUT content at the time the IUT was handed over to the lab. If certain values change, e.g. temperature sensors, wildcards may be included in the EPICS. The file is in text format describing the functionality in the header section of the document (BIBBS, supported Object Types, Data-Link-Layer, etc.) plus a copy of all objects contained and a list of all properties and values.



Test scripts: While some tests can easily be issued manually using explorer tools, the VTS (Visual Test Shell) or even a B-OWS (Operator Workstation), some tests are easier to repeat using scripts. VTS has a simple but limited scripting language, the BACnet Test Framework software is not as flexible as VTS for spot checks but with its PYTHON integration (a popular scripting language) it is perfect for repetitive tests.

Test tools

As said above, there are many options for different tools to test BACnet functionality and pre-testers should not only rely on one single tool. In addition to the tools a pre-tester should also use a network sniffer like Wireshark to analyze the packets on the network and for testing MS/TP timing a serial analyzer and an oscilloscope is required.

Functional areas in the BTL test plan 5.0

The "old" test plan 5.0 has been in use for almost 2 years now and needed to be updated. The test plan number by the way represents the supported BACnet-revision, so test plan 5 covered BACnet functionality of up to BACnet revision

[1] Frank Schubert, MBS GmbH, is member of the ASHRAE SSPC-135, the Advisory Board and Working Group Technique of the BIG-EU as well as training-leader of the BACnet Interest Group Europe, frank.schubert@mbs-software.de.

5, this explains why BTL jumps from 5 to 9 now.

The test plan covers different areas of functionality to be tested.

Basic Functionality: This must be supported by all BACnet devices.

Objects: According to the supported object types of the IUT certain tests must be applied to test the correct object behavior. If special functionality is supported like elapsed active time counting or writable state text properties, etc. certain extra tests apply.

Data-Sharing BIBBs: With these tests the data-exchange (reading, writing, COV-reporting, etc.) is tested.

Alarm and Event Management BIBBs: With these tests alarming is tested. This includes transport of alarms, event-information, enrollment-information and alarm acknowledgement.

Scheduling BIBBs: With these tests executing and exchanging schedule programs is tested. This includes viewing and modifying schedule programs as well as testing the correctness to schedule on time including exception schedule.

Trending BIBBs: These tests are intended to test the correctness of trending capabilities and to test correct responses using the ReadRange service to retrieve trend log data. It also includes testing the correct behavior purging the buffer and starting/stopping the logging.

Device and Network Management BIBBs: These tests are used to check the correct behavior of device management functions like device- and object binding (Who-Is, I-Am, Who-Has, I-Have), restart, device communication, time-synchronization, etc. up to backup and restore.

Data Link Layer: Depending on the supported layer certain tests apply to the IUT. BACnet/IP for example requires non-BBMD and if applicable BBMD tests, MS/TP master devices require to pass the poll-for-master tests and token-passing tests just to mention a few.

Routing: If the IUT is a router or can be made to provide routing capabilities, routing between the different layers is tested as well.

New functions of the updated BTL test plan 9.0

Revision 9 of the BTL test plan now covers the Structured View, the Event Log and Trend Log Multiple object types plus the related BIBBS to test Event Log alarming capabilities and Trend Log Multiple logging.

The new triggered and clock-aligned logging is covered as well. Many of the CR (Clarification Requests) sent to the BTL-WG in the past two years have been considered and a lot of tests have been updated or modified to be more precise.

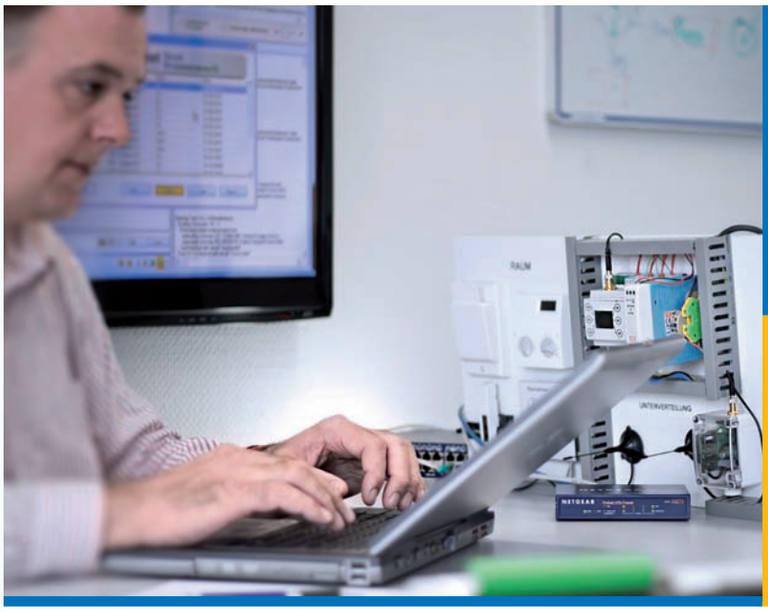
Further work items or the BTL-WG

Even with the updated functionality covering Revision 9 of the standard there is a lot of remaining work to do. Segmentation capabilities are not yet directly tested, PTP, ARCnet, BACnet over LonTalk, ZIGBEE layer testing is not included and updating to the next BACnet releases supporting UTF-8 or the primitive value objects are only few of the next work items.

The BTL-WG is open for interested parties to support the testing activities and specifications. The group meets every two weeks in a telephone conference and in face-to-face meetings at the SSPC conferences.

Volunteers to support this group are always welcome.

BACnet Pretesting Services by MBS



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ASHRAE SSPC-135 Meetings – BACnet Proceedings

Bernhard Isler[1]

The most recent ASHRAE SSPC-135 BACnet Committee meeting took place in Montreal, Canada, at the ASHRAE Annual Meeting over the last week-end of June. Substantial work was performed during these meetings, both by the subordinate working groups and in the plenary sessions. Clear focus was put on processing public review comments and preparing addenda drafts for next public review. Also, a number of new addenda were compiled and approved by the committee for initial public review.

In May, a one week interim meeting was held in San Francisco. As a premiere for the spring interim meeting, after many years assembling in Germantown MD, the Pacific Energy Center, a PG&E venue, provided excellent meeting facilities for the working groups and the plenary. These meeting rooms usually serve for trainings on HVAC and other building infrastructure, thus created an inspiring environment for the attendees.

Although some addenda were still open for public review while the San Francisco meeting, comment resolution and addenda draft revision was performed as far as comments were available. All this work was considered being preparation for the regular committee meeting to take place in Montreal.

BACnet 2010 published

This spring, a new compilation of the BACnet standard was published by ASHRAE. The blue book is now more than 1000 pages. For the paper print, thinner paper was chosen to keep the size of the book limited. BACnet 2010 incorporates BACnet 2008 and all addenda approved and published by end of January 2011. This includes addenda *g, h, j, k, l, n, o, p, q, r, s, t, u, v, w, x, y, z, ab, ac, ag and ah*. Electronic and printed forms of the standard are available at the ASHRAE online bookstore www.ashrae.org/bookstore.

While the Montreal meeting, the ASHRAE board of directors approved the first three addenda to BACnet 2010 for publication. Those were:

Addendum 135-2010ad	*Miscellaneous changes*
Addendum 135-2010ae	*Minor physical access control changes*
Addendum 135-2010af	*Alarming revision*

Alarming revision approved for publication

Among the addenda approved for publication is addendum 135-2010*af*. This completes extensive work of the objects & services working group (OS-WG) and the committee on the comprehensive overhaul of the alarm and event detection and reporting mechanism. Backward compatibility was a major concern in this endeavor. The concepts are now clearly described at one place. Inconsistencies are removed, as well as flaws and unnecessary restrictions. Configuration for event detection and dynamic inhibition is added as a general principle to all event reporting objects. New mechanisms for stateless alert notifications and event notification forwarding are added.

But work on alarming is not yet finished. The OS-WG has a number of proposals on the plate that build on addendum 135-2010*af*, and will provide new event algorithms, add extended capabilities to existing algorithms, and will relax requirements on support of some outdated alarm summarization services.

Addenda approved for public review

In Montreal, a number of addenda were approved for initial or subsequent public review. Those are addenda to 135-2010 as well as to the test standard 135.1-2009. All addenda to standard 135-2008 that were not approved for publication when 135-2010 was compiled and published are now addenda to 135-2010, keeping the respective addendum identification letters the same. Addendum 135-2008*i* is now Addendum 135-2010*i*, as an example. The addenda approved for regular "publication" public review (PPR) are:

Addendum 135-2010i	*PPR5*	*Lighting Output Object*
Addendum 135-2010aa	*PPR1*	*WriteGroup Service & Channel Object*
Addendum 135-2010ai	*PPR1*	*Network Port Object*
Addendum 135-2010ak	*PPR2*	*Miscellaneous Changes*
Addendum 135-2010al	*PPR1*	*Gateways, Routers and BBMDs*

Addendum 135.1-2009j	*PPR2*	*Miscellaneous Changes*
Addendum 135.1-2009k	*PPR2*	*Manual MS / TP Tests*
Addendum 135.1-2009l	*PPR2*	*Miscellaneous Changes*
Addendum 135.1-2009m	*PPR2*	*Test Additions*
Addendum 135.1-2009n	*PPR2*	*Miscellaneous Tests*

For the first time, the committee approved two addenda to 15-2010 for public review using the new "advisory" public review (APR) process. This process has been introduced by ASHRAE recently allowing committees to collect advisory comments from the public. As it is with the well known "publication" public review, comments are submitted through the regular online comment database web interface. APR comments received are not required to be officially resolved. They serve as guidance to the committee on proceeding. The ultimate public review before publication has to be a "publication" public review still. The addenda approved for APR were:

Addendum 135-2010am	*APR1*	*New BACnet/WS Web Services*
Addendum 135-2010an	*APR1*	*MS/TP Extended Frames*

New BACnet/WS web services

Addendum 135-2010*am* introduces a set of new BACnet/WS web services. This extends Annex N with web services that follow the HTTP REST model. They use the Atom Publishing Protocol (RFC 5023) and exchange data using the Atom Syndication Format (RFC 4287). For pushing feed data to clients, publish/subscribe services are introduced that use the PubSubHubbub procedure. For structured data, the BACnet/XML format definitions of 135-2010 Annex Q are used.

MS/TP extended frames

Addendum 135-2010*an* proposes extensions to the MS/TP datalink definition to enable the transport of large frames. With this, MS/TP becomes able to transport frames that are of the same size as transportable on other BACnet datalinks, such as BACnet/IP.

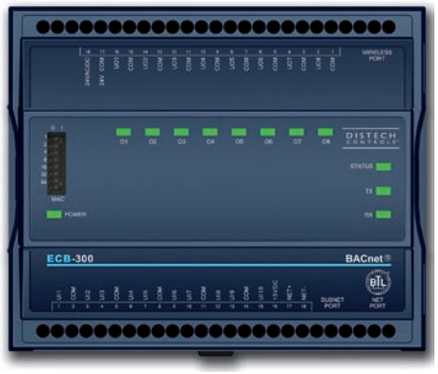
A major obstacle found in elaborating this addendum was that the CRC-16 used for the today smaller frames is known to provide insufficient error detection when using it for large frames. To overcome this and keep the error detection capabilities on an acceptable level, the large frames will use a CRC-32, with a carefully selected Koopman polynomial.

To stay up-to-date on public reviews starting, standards publications, as well as interim meeting announcements, you may subscribe for the ASHRAE Standards Actions newsletter through the ASHRAE website at www.ashrae.org/publications/detail/16150

[1] Bernhard Isler is secretary of the ASHRAE SSPC-135, Producer Voting Member of the committee, and convenes the Objects & Services working group. He is a member of Siemens Switzerland Ltd, Building Technologies Division, located in Zug, Switzerland, bernhard.isler@siemens.com

Microprocessor-based Controller to Broaden its New Standard

Distech Controls, a leading provider of building automation and energy management solutions announced today that the new BACnet Advanced Application Controllers (B-AAC) BTL Listed ECB-300 is now available. This latest release extends Distech Controls' new standard in BACnet offering.



The ECB-300 can be custom programmed using EC-gfxProgram 4.0 graphical programming interface.

The ECB-300 is a microprocessor-based programmable controller designed to control various building automation applications such as small to medium air handling units, chillers, boilers, and cooling towers. The ECB-300 can be custom programmed using EC-gfxProgram 4.0 graphical programming interface.

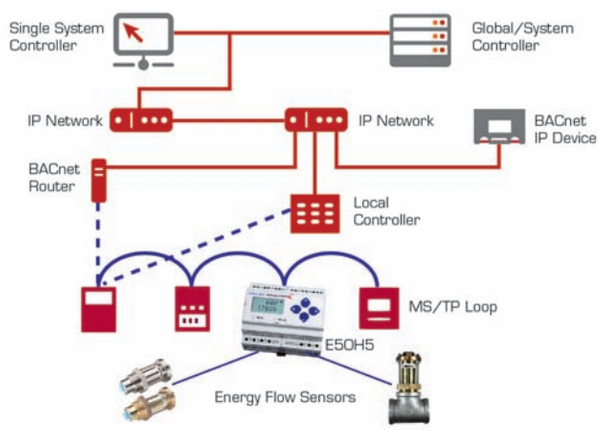
In addition, the company announced that the ECB-400 and ECB-600 Series are now also BTL Listed as B-AAC controllers, providing increased data sharing services such as read and write multiple properties, alarm generation and events management, scheduling capabilities, as well as time synchronization.

With the introduction of these B-AAC controllers, Distech Controls now offers products in all BTL device profiles for controllers, offering engineers and system integrators more flexibility and options for system design and installation.

Distech Controls, Inc.
gpalermo@
distech-controls.com
www.distech-controls.com/

Native BACnet MS/TP Power and Energy Meter

Veris' E50H5 Power & Energy Meter was designed to meet the needs of the commercial building industry communicating natively over BACnet MS/TP at a data rate up to 115.2 kbaud, and offering two pulse inputs for sensors monitoring additional forms of energy.



The E50H5 easily integrates into a building automation system with its embedded BACnet MS/TP protocol, while increasing system capacity with two pulse contact accumulators for water, gas, or flow sensor integration.

"The E50H5 was designed for the building automation market," stated Gary Richmond, Veris' Energy and Industrial Product Manager. "The E50H5 integrates energy use and consumption data into the BAS system through the industry's preferred BACnet protocol, making it easy to gain visibility of power use."

Native BACnet MS/TP communication

The E50H5 easily connects to a BACnet control system with its embedded BACnet MS/TP protocol. The ability to network the E50H5 over an already established MS/TP trunk eliminates the need for additional wiring and network drops, significantly decreasing installed costs. The integrated functionality of the meter furthers cost savings by allowing multiple devices to be daisy-chained over BACnet MS/TP.

Ultimate versatility

The meter fits a wide array of applications with its flexible mounting options of panel, DIN rail, or wall with optional enclosure, as well as covering 90-600 VAC and 5-32,000Amps. The E50H5 features two pulse contact accumulators for water, gas, or steam flow sensor integration, 9600 baud to 115.2 kbaud serial communication, data logging, and built-in display.

Veris Industries
vicki.pack@veris.com
www.veris.com

Banner Year for New BTL Listed Products

This has been a banner year for new BTL Listed products. Already in 2011 more products have obtained the BTL Listing than in any year previously, and that's with half the year yet to come! 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.

Passing BTL test

The BTL Mark is permitted to be displayed on devices which have passed BTL Testing. This testing ensures that a device correctly implements all of the BACnet functionality that it contains. ASHRAE standard 135.1 – 2009 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 testing and commence the testing process. Fillable forms and instructions describing the entire testing process are in the 5.0 test package, at www.bacnetinternational.org/associations/8066/files/BTL_Test_Package_5.0.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 testcase can be created from those two documents. A signed BTL Testing Agrmt and US$1,000 deposit secures a place in the test queue. BACnet 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.

Duffy O'Craven
Manager of the BACnet Testing Laboratories (BTL)
Chair of the BTL Working Group
btl-manager@bacnetinternational.org

Advantech Corporation
- BAS-3000BC Series

Airtek International
- BACnet Application Specific Controller
- BACnet Building Controller

Alerton
- VLCA-1688
- MS/TP Microset II
- VLC-444

BELIMO Actuators (Shanghai) Trading Ltd.
- Room Control Module BACnet

Cylon Controls Ltd.
- Unitron Communications Controller

Distech Controls, Inc.
- ECB-300 and ECB-400 series and ECB-600 series BACnet Programmable

Ebtron
- HTN104

FieldServer Technologies
- ProtoCarrier/ProtoCessor
- ProtoCessor FFP-485
- ProtoNode RER
- QuickServer

Gesellschaft für Regelungstechnik und Energieeinsparung m.b.H.
- ems building controller

ITRI
- BACnet/IP to Modbus Gateway

ITT Corporation
- Technologic Constant Speed Pump

Kieback&Peter GmbH & Co. KG
- DDC4000

Lennox International
- Prodigy Rooftop Unit Controller

Mitsubushi Heavy Industries, Ltd
- Superlink BACnet Gateway Controller

Open General
- B Series

Quantum Automation
- iCON-3400PBE Programmable DDC

Schneider Electric
- ATV212

SE-Elektronic GmbH
- E-DDC

Siemens
- BACnet MS/TP Point Pickup Module
- BACnet MS/TP Point Pickup Module
- Programmable BACnet Terminal Equipment Controller
- Controller
- PXC Compact Unitary Equipment Controller and
- TC Compact Unitary Equipment Controller
- Controllers
- Climatix

Trane
- UC400 Programmable Controller

Tridium
- Niagara AX Supervisor with BACnet B-OWS
- Niagara AX Supervisor with BACnet B-AWS

WattMaster
- PT Link II BACnet

Why go BTL?

The BTL mark. We have seen it. Maybe it was in a specification, or a product we installed. Was it possibly on a website or advertisement created by those wonderfully wacky BACnet International people; a mystical circular logo glowing as if the sun was rising for the first time? Or was it a tattoo on that guy at the trade show? Ok. Maybe no one has a BTL tattoo, but a lot of BACnet products do, and more and more are being listed every day. BTL is an important part of being BACnet.

There are a number of manufacturers who make various products designed to communicate within a building. Everything from elevators to HVAC to lighting to access control are being integrated to give a more detailed picture and more precise control over the systems operating within facilities globally. With complete integration, buildings can be drawn together to communicate over the Internet and give users access to their system from almost anywhere in the world. While all of this to some might appear to be Greek and black magic all wrapped into one, much of it is made possible through the use of open protocols. More specifically, it is being made easier through the use of BACnet.

The importance of BACnet

To understand "why go BTL," one must first realize the importance of BACnet. In the not so distant past, systems were designed by different manufacturers to only communicate with products they created. This meant if you wanted disparate systems to talk to one another you would need someone to write special drivers to get them communicating. Some manufacturers made their protocols available publicly and others hid them to prevent the proliferation of competitor product on sites with their systems. Today, this philosophy of doing business still exists. However, with the advent of BACnet, users have more choices. They can choose BACnet products! Whether a building is being retrofitted to communicate with older systems or being integrated for the first time, there are a number of products that exist today that allow more streamlined integration through BACnet. If you are new to this, and are thinking "huh?" Think of BACnet as a human language.

BACnet language

Each person performing needs to tell the next person a command or report on something they have been doing. If everyone were from a different country and did not speak a common language, you would need translators. But if everybody is speaking BACnet, then they all understand each other and can perform more efficiently with less communication breakdown or points of failure through the translators. In the building world, this means less gateways and less reliance on drivers being written correctly by integration houses or manufacturers to convert protocols. Of course one thing we have not discussed yet is what if everyone is not speaking the same dialect? How do we know a BACnet product is designed to communicate with the next BACnet product and not a different interpretation of the protocol? Enter BTL.

What BTL is

BTL stands for BACnet Testing Laboratory. This is an independent organization created by BACnet International to perform testing on BACnet products to ensure they meet the standards set forth in their listing. This benefits the manufacturer and consumer in multiple ways. Firstly, it guarantees the product has been tested for correct BACnet implementation. Rather than have the product released by a manufacturer, installed, and then find protocol mistakes that may have been made, BTL catches these implementation errors and informs the manufacturer and requires they be corrected. This saves time and money on the part of both the manufacturer and the customer. In fact, to date no product submitted to BTL has come to be tested and been error free. Secondly, having the BTL mark on a product means it has been tested rigorously to a standard. If it has the mark, the end-user, engineering firm, and installer can all rest assured it will communicate with other product tested to the same standard. Finally, in the specification marketplace it has become difficult to get into a building specification without the BTL mark. So, for the manufacturer it can be a show-stopper without the mark or at the least make it much more difficult to get on the project. With over 60 manufacturers today meeting BTL standards, not having the listing means being more susceptible to being left out. With BTL the manufacturer is letting the consumer know their product will communicate according to the standard while ensuring their own compliance and making it easier to be specified.

Testing specific functionality

As with all testing standards it is important to remember BTL is testing specific functionality. Look for other marks to ensure compliancy to safety and federal communication standards. In addition, remember having the BTL mark does not mean the product is now a commodity and one product is just as good as another. The BACnet standard is designed for protocol communications confirmation while still leaving competitive flexibility for manufacturers to design products with specific functionality and capabilities ▶

▶ not found with a competitive brand. Also, manufacturers should not make the mistake of thinking their product is now bulletproof once it passes BTL. Appropriate testing for other functions and capabilities should be applied. End-users, installers, and engineers should research each product for functionality and other compliancies before making a decision.

BACnet conformance

Having BTL on a product means the manufacturer is willing to invest in ensuring conformance to the BACnet standard. While there probably is no human out there sporting the BTL trademark as skin art, there are a large number of manufacturers that are proud to display BTL on what they sell. Whether you are looking at getting your product listed, looking for the importance of it in the specification, or thinking about adding a BACnet product to your facility, look for the BTL mark. It will ensure everything is communicating according to the standard.

For more information on BTL and to see a list of manufacturers and the products they carry with the BTL seal of approval go to www.bacnetinternational.com

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First Swan Award Presented to Bernhard Isler

The BACnet committee has been looking for a way to memorialize our departed friend and colleague, Bill Swan. During the June 25 plenary session of SSPC 135, David Fisher, president of PolarSoft Inc. announced the creation of the "Swan Award".

David Fisher (right) presenting Swan Award to Bernhard Isler.

"This award, which is to be presented yearly, honors the memory of our dear friend and colleague, Bill Swan, a.k.a. BACnet Bill, who passed away in June. We want to remember him always not only for his substantial dedication and contributions to BACnet, but also as a good and honest man, devoted to his family and faith," said Fisher.

"By creating this award, we carry on Bill's example of even-handedness, rational and considerate discussion, and a focus on how to make the standard better for everyone. The award honors those individuals who through their actions demonstrate the qualities of integrity, selflessness, camaraderie and fierce dedication to the standard that we admired in Bill."

The 2011 Swan Award was presented to SSPC Secretary Bernhard Isler of Siemens Switzerland Ltd (left). "It is our intent to continue to sponsor these awards in the future," explained Fisher, also noting that he had already received inquiries from other organizations within the BACnet sphere who are interested in sharing sponsorship.

Hot Spot in Vegas – BACnet International Booth

If you've ever manned a tradeshow booth, you're likely familiar with the sense of urgency to bring back a stack of business cards and qualified leads to justify the trip. This is one of the reasons why I find it so refreshing to design and work in the BACnet® International booth at AHR Expo. As an organization whose purpose is to actively promote improving building controls by encouraging the adoption of the BACnet protocol, BACnet International is at AHR Expo in a more educational capacity. It is also very interesting to stand, side-by-side with industry peers whose companies are the "who's who" of building automation, united in the common purpose of improving building controls by influencing the direction of global control specifications.

With luck you were near or on the perimeter of the booth.

As a non-profit, largely volunteer organization, it is sometimes difficult to organize and resolve issues that you could quickly address in a for-profit company. I would like to share with you how the BACnet International AHR Expo booth evolved into the eye-grabbing hot spot it was in 2011. The 2011 AHR Expo show booth represented the culmination of design improvements that spanned multiple years to conceive, approve, fund and implement.

Evolution of the solution

First, we eliminated the "bad spots". In AHR Expos of the past there were interior and exterior booth manning positions. If you were a lucky member participant, you were on or near the perimeter of the booth and spoke to a lot of people during the show. If you were on the interior, well, you had plenty of time to organize your thoughts. Another problem in the booth design was that kiosks within the booth were divided in four sections and shared. Even though united in our efforts to promote the BACnet message, members understandably prefer not to stand directly next to their largest industry competitors. Recognizing these issues, BACnet International adopted a design change in 2010 that gave every booth participant their own company branded kiosk on the perimeter of the booth. Position inequality was solved. To provide member companies the opportunity to meet with trade show attendees and customers we added a meeting table to the middle of the booth and violà, the booth became a significantly more inviting.

Design improvements spanned multiple years.

Though BACnet International consists of more than 75 member companies, you would not be able to tell from the 2009 booth design. Attendees were often confused when they visited the booth. Frequently, visitors thought that we were an organization that sold products, not one promoting the BACnet protocol. To help address this issue the decision was made to put the logo of every member company of BACnet International on the exterior walls of the booth. This provided members, even those not directly participating in AHR Expo, an additional benefit of membership while giving trade show attendees a better idea of who BACnet International is. We still get the occasional confused visitor; but requests for our line cards have diminished significantly.

With these changes came another inequality to address. As one would expect, large companies can afford to send a lot of hardware and one of their employees to man a kiosk position in the BACnet International booth; however, the Marketing Committee recognized that these costs caused smaller and newer members to be underrepresented at the show. No solution on how to include them without diminishing the investments of the larger companies and value of their premium positions was readily evident. It wasn't until the Marketing Committee was addressing a different issue, maximizing booth traffic, that the solution to the problem presented itself; fill the interior of the booth with BACnet technology.

On the surface, this sounded like a simple idea that would be easily implemented; however, mounting hardware in the booth of AHR Expos in past was always problematic, at best. Rarely did ▶

A meeting table provided member companies the opportunity to meet with trade show attendees and customers.

▶ we "fill the walls" with BACnet technology. More often the walls were sparsely populated with hardware and the gaps were filled with literature racks. There were many, understandable reasons for this:

1. We have no idea of knowing how much hardware to bring and will there be enough space to mount it.
2. We're sending a sales guy, not a hardware guy to man the booth, so he'll mount whatever he has in his bag.
3. We have to comply with crazy union rules for mounting…? I just flew in. I don't have time for that. Just forget it!

The elegant resolution

What if we gave members the opportunity to produce, at their leisure, in their place of work, an organized BACnet technology display that they just shipped to the show and was hanging up in the booth when they arrived? At AHR Expo 2011, BACnet International introduced the member technology showcases. Accessible to both large and small companies, fourteen participating members receive a 7.5 square foot panel to pre-mount and wire their BACnet offerings. The resulting display on the interior of the BACnet International booth resulted in a tremendous amount of traffic at the 2011 show.

The BACnet International booth at AHR Expo 2011 was hailed as a crowd and member pleaser. Over the three-day course of the show there was rarely anything but standing room only in the booth. I'm pleased to report that the 2011 booth help demonstrate the global nature of BACnet, the wide variety of participating companies and the breadth of available technology solutions for building automation. Though I'd love to tell you what we're working on for AHR Expo 2012, you'll just have to visit us in Chicago to see for yourself. ■

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Get Plugged In at PlugFest 2011

The BACnet Testing Laboratories Working Group invites manufacturers of BACnet products to attend the 2011 Interoperability Workshop at the Westin Atlanta Perimeter North Hotel in Atlanta, GA November 15-17, 2011. This is the twelfth annual BACnet Interoperability Workshop and is hosted by BACnet International. PlugFest permits vendors to test their BACnet products in a neutral and friendly environment with BACnet devices from other vendors. Last year 98 BACnet engineers representing 35 companies attended the workshop and improved their BACnet implementations and testing methods.

BACnet International PlugFest 2011

Where the pieces come together

"There is no better way to learn what you have mistakenly assumed everyone does the same, than at a BACnet PlugFest. Better at PlugFest, with engineers and tools at hand, than via irate calls from the field," says BTL Manager Duffy O'Craven. Attendees are a veritable "who's who" of individuals and companies who work in the BACnet community.

This three day event features twelve testing sessions, during which "teams" assigned to test with each other test freely in pairs or at roundtables designed for multi-vendor testing, called round table testing.

The one-on-one testing sessions allow each team to test their products with individual company products in scheduled sessions. There will be several sessions, one hour or two hours in length, during the workshop. Pairings are assigned by the BTL based on vendor availability and vendor preferences. The round tables available on Day 2 and Day 3 of the Workshop are available to teams who wish to have ad hoc testing with the other vendors who choose to participate in the round table that session.

In addition, the 2011 event will feature workshops taught by leaders in the field:

- Lori Tribble, Automated Logic
- Steve Karg, WattStopper and others

Please visit www.bacnetinternational.org/plugfest for a complete description of workshops available.

For more information on the PlugFest event, including previous participants, eligibility and pricing, schedule, registration, etc., please visit www.bacnetinternational.org/plugfest ■

Showcase Your BACnet Success

Welcome to the future of case studies… BACnet International Success Stories highlight projects from around the world which employ the BACnet protocol to automate building systems. The integrated building systems include HVAC, CO_2, water, power monitoring, geothermal systems, lighting smoke control, and security systems. Many of the products detailed in these success stories are showcased in the BACnet® International product catalog. Over the last two years, the Success Stories database has grown to include over 30 stories from 8 countries. Stories range from the Metropolitan Museum of Art in New York to the Melbourne Cricket Ground in Australia.

The Melbourne Cricket Ground in Australia

The Metropolitan Museum of Art in New York

Submission is simple and easy using the online Success Stories submission tool, available at www.bacnetinternational.net/success/. The advantage of the online tool is you can begin a story, save it, and come back later to complete it or complete it all in one shot – the choice is yours. After being approved, the Success Story will be highlighted and promoted in the BACnet International Journal, the monthly Cornerstones eNewsletter, and on BACnet International's social media websites – facebook, twitter, LinkedIn, as well as on the BACnet International website, and is eligible for the Leader of the Pack awards. BACnet International's annual, "Leaders of the Pack" awards to recognize the achievements of individuals and companies involved in the BACnet community. This awards ceremony takes place annually at the Facility Decisions Conference & Expo show in Las Vegas, NV. All in all, a success story is a great way to promote a successful project and it is FREE of charge.

Future plans are for plaques to be displayed to honour outstanding stories at Facility Decisions expo. Currently, you can submit, search, and browse the Success Stories. Photography accompanies each story, so it is fun to browse through and see the projects and companies that employ BACnet. BACnet Success Stories are quick, easy, valuable and free.

Promote your company while communicating the versatility of the BACnet® protocol. All submissions are eligible for the "Best in Show" awarded annually at Facility Decisions Conference and Expo.

www.bacnetinternational.net/success/stories.php

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Welcome to the BACnet International Family

BACnet International community membership includes a who's who list of top tier companies 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 these ranks:

Member of BACnet International

ADVANTECH

Advantech Co, Ltd
Taiwan
Silver Member of BACnet International
www.advantech.com/

Founded in 1983, Advantech is a leader in providing trusted innovative embedded & automation products and solutions. Advantech offers comprehensive system integration, hardware, software, customer-centric design services, and global logistics support; all backed by industry-leading front and back office e-business solutions. We cooperate closely with our partners to help provide complete solutions for a wide array of applications across a diverse range of industries. Advantech has always been an innovator in the development and manufacturing of high-quality, high-performance computing platforms, and our mission is to empower these innovations by offering trustworthy ePlatform products and services. With Advantech, there is no limit to the applications and innovations our products make possible.

CONNECT AIR Wire and Cable

Connect-Air International
United States
Silver Member of BACnet International
www.connect-air.com/

Since 1978, Connect-Air International has been a leader in supplying electronic cable and cable assemblies. With an experienced staff and vast resources, we can meet even the most difficult interconnection needs. Although we specialize in low voltage wire & cable, our capabilities expand to fiber, metal clad, some industrial, and Fire Alarm/Security hardware. Our goal is to provide you a single source for the products you and your customers demand. Connect-Air Wire & Cable is headquartered in Seattle, WA and has 7 US sales/warehouse facilities located in Arizona, California, Georgia, Massachusetts, Illinois, Oregon, and Washington.

LUTRON

Lutron Electronics Co. Inc.
United States
Silver Member of BACnet International
www.lutron.com/

Lutron Electronics, headquartered in Coopersburg, Pennsylvania, designs and manufactures energy-saving lighting controls, automated window treatments and appliance modules for both residential and commercial applications. Its innovative, intuitive products can be used to control everything from a single light, to every light, shade and even stand-by power in a home or commercial building. Lutron products make any space more versatile, while enhancing ambiance, comfort and productivity. They also save energy and make light bulbs last longer, making them an eco-friendly addition to the home and workplace. Founded in 1961, Lutron estimates that the installed base of its products saves the nation nearly 10 billion kWh of electricity, or approximately $1 billion in utility costs per year. Lutron manufactures more than 16,000 energy-saving products, sold in more than 100 countries around the world.

Calendar of BACnet Events

Date	Location	Event	Information	
2011				
October 4-6	Toronto, Canada	Greenbuild	BACnet International booth	BACnet International Office, info@bacnetinternational.org
October 11-12	Las Vegas, NV	Facility Decisions Conference & Expo	BACnet International booth, education sessions, awards ceremony and reception	BACnet International Office, info@bacnetinternational.org
November 10	Hong Kong, CN	BACnet Forum Hong Kong		www.bacnetforum.org, china@mardirect.de
November 15-17	Atlanta, GA	PlugFest	Hosted by BACnet International, includes interoperability testing, roundtable testing, education sessions	BACnet International Office, info@bacnetinternational.org
2012				
January 21-25	Chicago, IL	ASHRAE Winter Conference		ashrae@ashrae.org
January 23-25	Chicago, IL	AHR Expo	BACnet International booth (member product showcase display) and education track	BACnet International Office, info@bacnetinternational.org

A Tribute to Bill Swan

By Steven T. Bushby, H. Michael Newman and Kathy Swan

Bill was born in Virginia in the early spring of 1952 and was soon the oldest of the three children, himself and two sisters, in his family. Their parents, the Rev. William Orr Swan, Jr., and his wife Mary, took them to Michigan where his father's day job was with Dow Chemical in Midland. Bill's penchant for things technical showed itself early on. He was proud of having put together a "Star Roamer" radio kit all by himself, thus being able to listen to religious music on Sunday nights. And he also learned to play the baritone horn and tuba in the Midland High School band and orchestra, skills that prepared him in later life to tackle the recorder and bagpipes.

Education

When Bill was sixteen, half way through his high school career, his family moved to Sunnyvale, California, where he graduated from Homestead High School, alongside the future founders of Apple, Steve Jobs and Steve Wozniak. While they were preparing, one must suppose, to become multi-millionaires, Bill was having fun in the electronics lab and playing around with CB and ham radio. Bill then went on to study at Foothill College in Los Altos Hills and managed to land an internship at the NASA Ames Research Center in Mountain View where he had the chance to work on wind tunnel tests of the Space Shuttle before the first one ever flew.

Bill earned his Bachelor's Degree then continued in graduate school at the University of California at Santa Barbara and, in 1978, he earned his Master's Degree in Electrical Engineering and Computer Science, Magna Cum Laude. Bill's engineering career had already begun with his first job at E2T in Carpinteria, California. After graduation, he went to work for Paratronics in San Jose, Alspa Computer in Santa Cruz, Applied Microsystems in Redmond, Washington, Personal Scientific in Woodinville (later to become Summation in Kirkland) and CSI in Lynnwood. Many of these were the kind of small startups that Bill loved best of all. Even Alerton in Redmond, Washington, Bill's first building automation company, was a startup that, at the time, was little known outside the Pacific Northwest. When Bill started there in 1995, he was immediately put to work writing code for Alerton's controllers.

"That's when the fun began. But within a few months I was fielding questions such as "How do I encode an ObjectIdentifier?" and way too often responding, "That's Clause 20.2.14, page… 342," and flipping it open, and that's where it was! This worried my coworkers a bit. (I cannot do that anymore.)"

Career

Bill's BACnet career began the same year, even before the standard was finally published. His superiors at Alerton, having discussed the possible future of the protocol with the chair of the ASHRAE BACnet committee, decided that adopting BACnet would be a winning proposition: if it succeeded in the marketplace, Alerton would be one of the first companies with interoperable BACnet products; if it failed, Alerton would still have a modern, capable protocol, developed by industry experts, for use in its own products that cost the company nothing to develop.

Bill remembered it this way in recollections that he sent to Mike Newman years later:

Sometime around March of 1995 Tony [Fassbind, Alerton's CEO] handed me a book, BACnet PR2 [public review draft 2], and asked me to read it. Which I did. Once. It didn't make much sense (it was very broad unlike other standards I'd read, such as IEEE 488) and Tony never asked me anything about it, so I forgot it.

Months later Tony and Clair [Jenkins, Alerton's President] called a company meeting for Thursday, August 17, 1995 at 10 AM, in the company lunchroom. Tony reviewed Alerton's history and how we got into the industry by latching onto a new idea, direct digital controls, that the big players with their investment in pneumatic controls were avoiding. He noted (surfing analogy drawn on a whiteboard) that this wave rolled through the industry and

enabled a number of startups to get into the market. He noted also that it's unusual to have two such waves roll through an industry in one lifetime but he and Clair saw a second one coming. Our customers wanted the independence BACnet would give them, but no manufacturers were giving BACnet anything more than lip service. He and Clair saw a huge opportunity to become an industry leader and they were going to bet the company on it by rolling out a complete BACnet line of products, similar to our Ibex line, top to bottom BACnet from the workstation down to the unitary controllers. He warned it wouldn't be easy: we were going to have to give our customers the utmost in service or risk losing them.

In conclusion he held up a copy of the standard (it must have been the 1994 PR2 draft because I don't think the 1995 version was in print yet) saying, "This is now our bible." Then he hands it to me and says, "And you're now the expert. Learn it."

So by September 1995 we were already on course, though not too far down the road.

BACnet role

Not only did Alerton tag Bill to lead their internal BACnet development efforts, they sent him off to join the BACnet committee and Bill showed up for his first meeting in June 1996 across from the Alamo in San Antonio. His talent and enthusiasm were recognized by his colleagues and he soon began to work his way up "through the chairs," becoming a working group leader, then committee Secretary, Vice-Chairman and, finally in 2004, Chairman. Throughout this time, Bill spearheaded many technical initiatives, such as work on refinements to BACnet's Master-Slave/Token-Passing protocol, its character set processing, and issues surrounding Network Address Translation, among others. All told, Bill authored about 93 change proposals, a staggering record. Even after passing the Chair's baton in 2008, Bill continued to participate and most recently was leading the effort to develop BACnet extensions for elevator systems.

But while Bill will be remembered by many for his technical accomplishments and contributions, not just to BACnet but to the even broader field of energy conservation, many of us will recall how he blossomed as an individual. Somewhat shy and a bit uncertain about his ability to lead the BACnet committee, Bill quickly learned the ASHRAE processes and procedures. More importantly, he gained confidence in dealing with ASHRAE's staff and officers and became an effective spokesperson for BACnet, even lifting the occasional scotch at the Society's Presidential Cocktail Parties. When Honeywell took over Alerton, Bill was sent to represent the company and BACnet at the BACnet Interest Group – Europe and became its first non-European vice-president. He also traveled the globe to attend meetings of ISO's TC 205, the committee that promoted BACnet to an international standard.

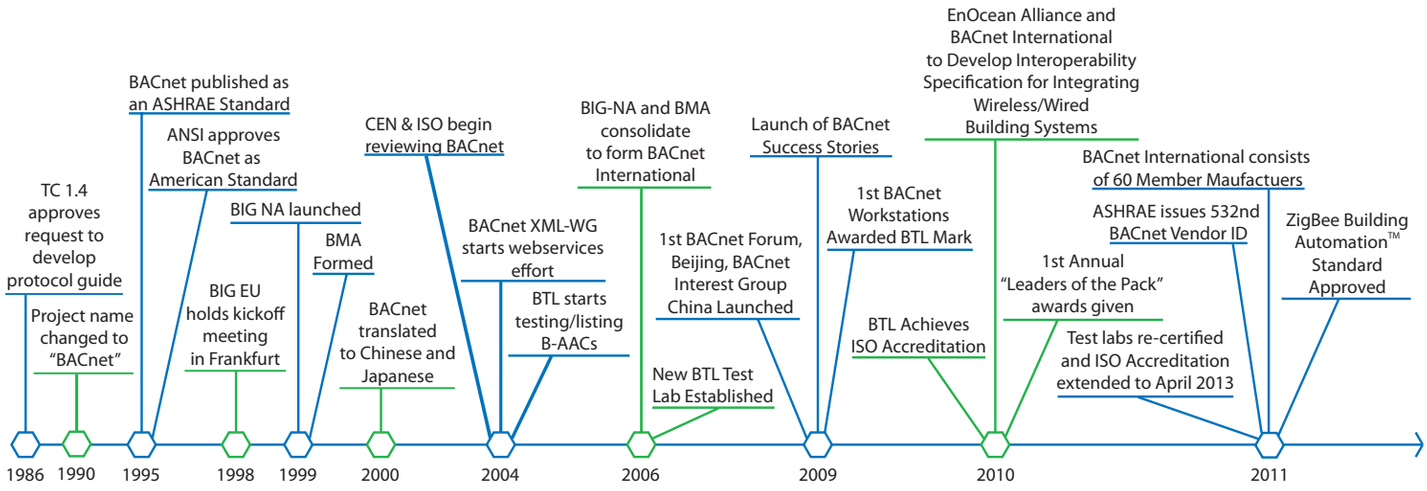
When the opportunity arose, Bill added to his portfolio by accepting the challenge of becoming the ASHRAE representative to the NIST Smart Grid Interoperability Panel. In that role he became immersed in the huge national effort to create a standards framework that will enable a completely transformed electric grid. Bill was thrilled to be intimately involved in a new industry-transforming activity.

Mike and Steve came to know Bill through his professional activities, but after years of meetings, dinners, and world travel they also came to know him on a very personal level. Bill was deeply religious, a devoted husband, a loving father and a good friend.

Bill's untimely death has left an ache in the hearts of all of us who knew him. He will be sorely missed!

[Bill's wife Kathy, who graciously assisted in the preparation of this tribute to Bill, has put together a memorial website at http://memorialwebsites.legacy.com/wos3/homepage.aspx There you can learn more about Bill's life and family.]

A Brief History of BACnet



Jun.	1986	TC 1.4 approves proposal to request the development of a protocol guideline.
Aug.	1986	Request for the establishment of a guideline project submitted to StdC.
Jan.	1987	PPIS decides that the proposed project should produce a standard rather than a guideline. StdC approves formation of SPC 135P with the title "Energy Monitoring Control Systems Message Protocol".
Jun.	1987	First SPC meeting held at Opryland Hotel, Nashville. Three WGs are formed for: "Data Type and Attributes"; "Primitive Data Formats"; and "Application Services".
Jun.	1990	StdC approves request to change project name from "EMCS Message Protocol" to "BACnet".
May	1991	SPC moves to propose public review of Working Draft 6, 11-2-0 (13).
Jun.	1991	StdC approves PR.
Aug.	1991	1st PR runs from 8/15 -> 11/13/91. 507 comments are received, 191 of which are from Honeywell.
Dec.	1993	SPC proposes 2nd PR of Independent Substantive Changes, 13-0-0 (13).
Jan.	1994	StdC approves 60 day 2nd PR from 3/15 -> 5/16/94. 228 comments are received. All but 3 were resolved.
Dec.	1994	SPC proposes 3rd PR of ISCs, 13-0-0 (13). LonTalk clause is to be included in standard now, rather than as an addendum.
Jan.	1995	StdC approves 3rd PR from 3/17 -> 5/1/95. Only 6 comments are received.
Jun.	1995	SPC votes to recommend publication, 11-0-0 (13). Total of 741 from 81 commenters in 11 countries were received overall. Only 11 remained forever "unresolved".
Jun.	1995	All requisite committees, including BOD, approve publication of BACnet as an ASHRAE standard.
Dec.	1995	ANSI approves BACnet as an American National Standard.
Jun.	1996	SSPC "unofficially" meets in San Antonio because StdC has not yet approved formation.
Jun.	1997	SSPC recommends PR of Addendum a 14-0-0 (14), BACnet/IP. Approved by StdC.
Nov.	1997	1st 60-day PR of Add. a runs from 11/7 -> 1/6/98. 13 comments were received.
May	1998	BIG-EU holds its kick-off meeting in Frankfurt.
Jun.	1998	SSPC recommends 2nd PR 7-0-0 (9). Approved by StdC.
Nov.	1998	2nd PR of Add. a runs from 11/15 -> 1/14/99, produces no comments.
Jan.	1999	SSPC recommends publication of Add. a, 17-0-0 (18). Approved by all ASHRAE committees, including BOD. Recommends 1st PR of Add. b, 16-0-0 (18).
Jan.	1999	BIG-NA launched.
Sep.	1999	Add. b of 17 ISCs finally begins 1st 60-day PR from 9/8 -> 11/8/99. 10 comments were ultimately received.
Sep.	1999	BIG-NA meets at Purdue.
Oct.	1999	ANSI approves Add. a as an American National Standard.
Dec.	1999	Add. b recommended for publication at special meeting at NIST, 11-0-0 (17). Add. c which includes life safety features, recommended for 1st PR.
Dec.	1999	BACnet approved as a Korean national standard, KS X 6909.
Feb.	2000	Add. b approved by BOD for publication. StdC approves 1st PR of Add. c.
Feb.	2000	Formation of the BMA is announced in Dallas.
Mar.	2000	BIG-AA formed and has booth at ARBS 2000 in Melbourne, Australia.
Apr.	2000	1st PR of Add. c runs from 4/8 -> 6/16/00 and produces 10 comments. (Comment period had to be extended because of the posting of the wrong draft.)
Jun.	2000	Companion standard 135.1P approved for PR by StdC. SSPC recommends PR of Add. d and e.
Jul.	2000	BACnet translated into Japanese.
Aug.	2000	ISO/TC 205 approves BACnet as a Committee Draft in Tromsø, Norway.
Oct.	2000	BIG-NA/BMA conference held at Penn State.
Oct.	2000	StdC approves PR of Add. d and e.
Nov.	2000	Chinese translation of BACnet released.
Nov.	2000	SSPC determines that a 2nd PR of Add. c is required and submits revised draft.
Dec.	2000	1st PRs of 135.1P, Add. d and e run from 12/1 -> 1/30/01. [# of comments received for the various docs?]

Jan.	2001	StdC approves 2nd 45-day PR of Add. c, from 3/23 -> 5/7/01. No comments were received.
Mar.	2001	SSPC recommends 2nd PR of Add. d and final publication of Add. e.
Apr.	2001	SSPC recommends publication of Add. c and d.
Jun.	2001	Add. c, d, and e are all approved for publication by the BOD. Publications agrees to publish "BACnet-2001" in time for upcoming Winter Meeting.
Sep.	2001	ANSI approves BACnet-2001 as an American National Standard.
Jul.	2002	A 5-month parallel enquiry within both CEN and ISO on the BACnet DIS 16484-5 begins 7/18 and will end 12/18/02.
Jan.	2004	Addenda a, c and d to BACnet-2001 approved for publication. These include enhancements to the Schedule and Life-Safety objects, and new objects representing utility meters otnd other measuring devices.
Jan.	2004	The BACnet XML-WG kicks off its BACnet Web Services effort.
Feb.	2004	The BACnet Testing Labs begins accepting BACnet Advanced Application Controllers (B-AAC) for its product testing and listing program.
Apr.	2004	BIG-EU has a booth at the Light+Building show in Frankfurt, Germany.
May	2004	Delegation of BACnet experts (Steve Bushby, Mike Newman and Jim Lee) travels to Dubai to conduct a seminar on BACnet for BIG-ME and ASHRAE's Emirates Falcon chapter. They then went to Moscow to attend the SHK Moscow Exhibition with ABOK, ASHRAE's sister society in Russia.
May	2004	VDI and BIG-EU condiuct a BACnet training sessions in Dusseldorf, Germany, titled "Gebäudeautomation mit BACnet" (Building Automation with BACnet).
May	2004	The BTL announces BTL-listed B-AAC controllers.
Jun.	2004	17 years after the first meeting of SPC 135P, SSPC 135 meets again in the same place, in Nashville.
Sep.	2004	The North American BACnet Plugfest is held in Skokie, IL, with 75 attendees from 22 organizations.
Oct.	2004	BACnetWeb Services goes to first public review.
Oct.	2004	BIG-EU publishes first issue of BACnet Europe Journal.
Feb.	2005	Plans to form BIG-RU (Russia) under ABOK are announced.
Feb.	2005	A steering committee to form BIG-SE (Sweden) is announced.
Aug.	2005	5 BACnet seminars held in the UK in Glasgow, Edinburgh, Newcastle, Manchester and Birmingham.
Sep.	2005	The North American BACnet Plugfest is held in Boston.
Sep.	2005	BIG-EU conducts two-day "BACnet Forum 2005" in Berlin, commemorating 10 years of BACnet.
Oct.	2005	BACnet Conference and Expo conducted in Nashville, TN.
Oct.	2005	First book devoted entirely to BACnet is published: "BACnet Gebäude-Automation 1.4" or "BACnet Building Automation, 1.4", by Hans. R. Kranz.
Jan.	2006	BIG-SE hosts BACnet seminar at Nordbygg 2006 in Stockholm under the theme "BACnet's role in future Building Automation."
Jan.	2006	BACnet International launched from consolidation of BIG-NA and the BACnet Manufacturers Association, and hosts a multivendor booth at the AHR Expo.
Feb.	2006	BIG-EU board becomes international with members from Germany, Switzerland and Netherlands. BIG-EU members now come from Austria, Belgium, Canada, the Czech Republic, England, Finland, France, Germany, Italy, the Netherlands, Sweden, Switzerland and the USA.
Mar.	2006	ASHRAE offers first online seminar on BACnet.
Mar.	2006	ASHRAE issues the 200th BACnet Vendor ID.
Mar.	2006	New BTL Lab opens in India.
Apr.	2006	BIG-EU publishes the fourth BACnet Europe Journal.
Jun.	2006	The Building Network Institute (Gebäude Netzwerk Institut) holds a BACnet training course at the Fachhochschule Solothurn Nordwestschweiz in Olten, Switzerland.
Sep.	2006	BACnet Web Services is approved for publication.
Oct.	2006	North American plugfest held in Vancouver, BC.
Nov.	2006	BIG-EU publishes the fifth BACnet Europe Journal.
Nov.	2006	New testing and Interoperability working Group (TI-WG) meets for the first time.
Jan.	2007	BIG-EU hosts "BACnet Forum Amsterdam".
Mar.	2007	BIG-EU and VDI host a two-day training class in BACnet in Karlsruhe, Germany.
Apr.	2007	BACnet France Association forms, in Paris.
Jul.	2007	BACnet Interest Group – Finland (BIG-FI) is announced.
Sep.	2007	largest yet BACnet Conference and Expo held in Phoenix, produced by BNP Media and BACnet International.
Oct.	2007	AMEV (Mechanical and Electrical Engineering Working Group of German National, Regional and Local Governments) has just published, in German, "BACnet in Public Buildings – BACnet 2007", a recommended practice guide for use by governmental authorities throughout Germany.
Oct.	2007	North American Plugfest held in Milwaukee, with 108 engineers from 34 different companies from 6 different countries.
Oct.	2007	European Plugfest held in Stuttgart, Germany, with 20 companies participating.
Jan.	2008	BIG-FI holds BACnet seminar in Helsinki.
Mar.	2008	Second BACnet France Journal is published.
Apr.	2008	BIG-EU has its lrgest-yet booth at the Light+Building show in Frankfurt, Germany.
Apr.	2008	BIG-EU celebrates its 10th "Birthday". From its beginnings in 1998 with just 18 members, BIG-EU has grown to have 80 members – and the rate of growth shows no sign of slowing.
Sep.	2008	Engineered Systems and BACnet International produce BACnet conference in Dallas, titled "Green Sustainable Building Controls Conference".
Mar.	2006	New BTL Test Lab Established
May	2009	Launch of BAcnet Success Stories
Aug.	2009	First BACnet Workstations awarded BTL Mark
Nov.	2009	First BACnet Forum Beijing, BACnet Interest Group China launched
Jan.	2010	EnOcean Alliance and BACnet International to Develop Interoperability Specification for Integrating WIreless/Wired Building Systems
Mar.	2010	BTL Achieves ISO Accreditation
Oct.	2010	First annual "Leaders of the Pack" awards given
Jun.	2011	Test labs re-certified and ISO Accreditation extended to April 2013
Jul.	2011	ZigBee Building Automation(TM) standard approved

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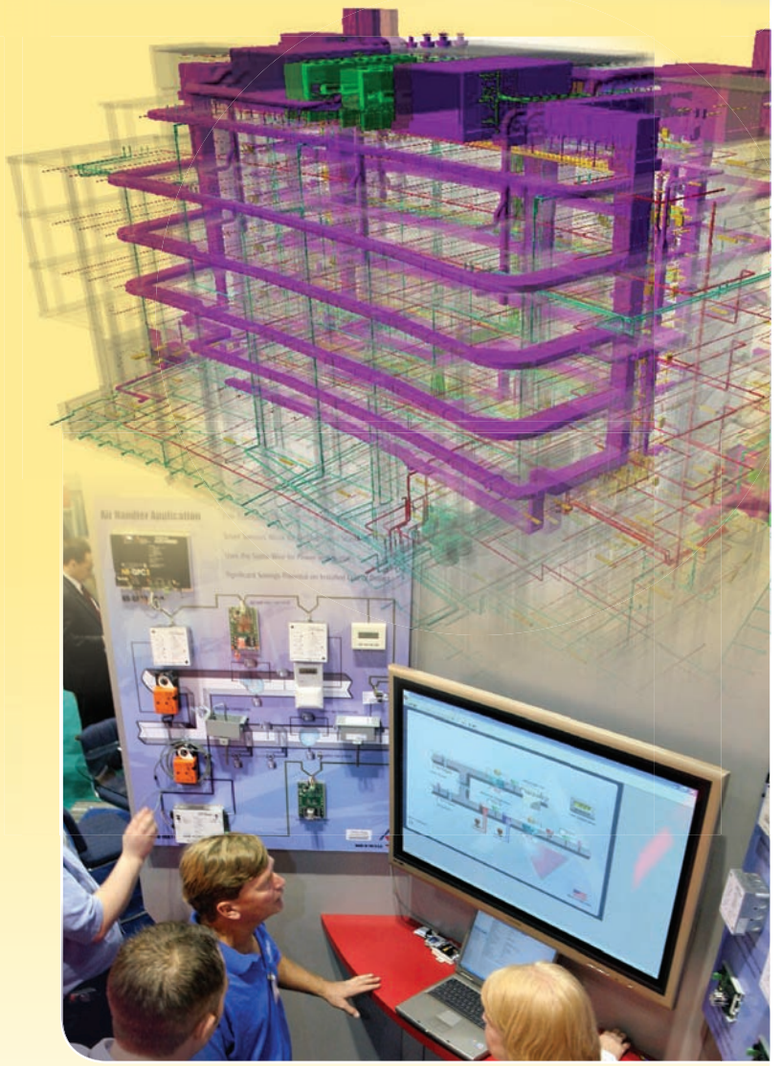

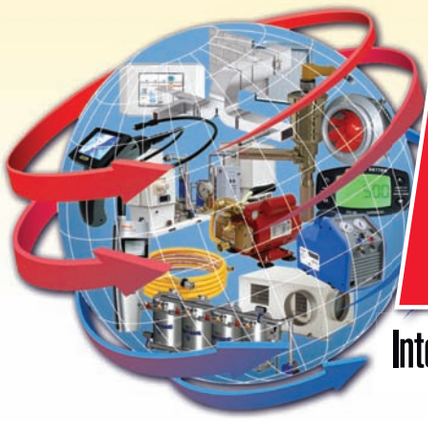

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