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Issue 25

BACnet's Future in Building Automation

A PUBLICATION BY: **BACnet** International®

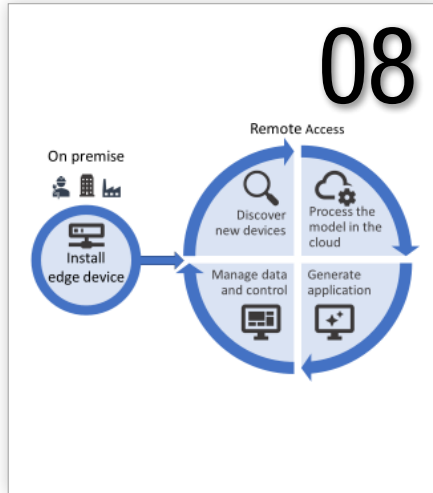# BACnet Certificate Authority Reference Implementation Tool (BACCARI) now available for download!

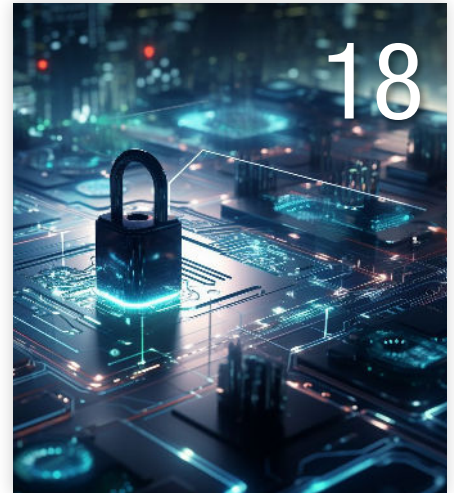Join the Cybersecurity Acceleration Program to take advantage of this industry standard tool.

BACnet International is proud to announce the alpha release of BACCARI – The BACnet Certificate Authority Reference Implementation Tool, now available to all registered participants of the Cybersecurity Acceleration Program. This project is an example implementation of a Certificate Authority for BACnet. It builds and processes files using the CARI file format, as proposed in 135-2020 Addendum cs. The zip file format conveys BACnet/SC CSRs to a certificate authority and returns the signed operating certificates. This tool will become the industry's standard for certificate authority implementation.

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Content
Issue 25

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The BACnet Institute (TBI), administered by BACnet International, is a **FREE** online portal for BACnet-focused learning and knowledge sharing. It provides an easy path to BACnet information and learning for everyone involved with BACnet systems. Each year TBI continues to grow. Since its launch in January 2017, almost 10,000 registered users across more than 80 countries have accessed its resources.

COURSES:

On-demand, interactive courses

TBI offers three online, self-paced courses. In need of CEUs? All courses on TBI offer **FREE Continuing Education Units (CEUs) and Professional Development Hours (PDHs)** upon completion.

RESOURCES:

Over 200 articles and presentations

A broad, curated collection of **articles, white papers, webinars, and recorded industry presentations**.

COMMUNITY:

BACnet forum for knowledge-sharing

The Community section **encourages open discussion** of current BACnet-related topics, sharing insight, across differing expertise and perspectives.

ADMINISTERED BY **BACnet** International

Letter from the President

Dear Reader,

The story of BACnet's history is a great one, but this issue of the Journal of Building Automation is about a different story. It's about the story of BACnet's future. A future embedded in the rapidly evolving world of building automation. Much like the IT industry, building automation is undergoing a transformation that embraces hybrid solutions where on-premises systems and controls seamlessly interact with cloud-based platforms for analytics, diagnostics, and AI assistance. This evolution brings forth heightened cybersecurity concerns, necessitates a reevaluation of solution architectures, and opens new application opportunities.

Naturally, these changes prompt questions about BACnet's role in the dynamic future of building automation. While this issue of the Journal cannot address every question, it does provide relevant insights and points us in the right direction.

A Key Starting Point: "BACnet Global Community Outlook"

Begin your exploration by delving into the "BACnet Global Community Outlook: The Future of the BACnet Protocol as it Approaches 30 Years." This piece offers a concise summary of information shared during a panel discussion I had the privilege of moderating at the AHR Expo. Our discussion kicked off with a presentation of multiple data points, revealing sustained global interest in BACnet across the entire industry value chain. Notably, **77% of projects worldwide now specify BACnet.**

The panel also featured representatives from **Europe and India,** providing valuable insights into the industry's future trajectory. For a high-level overview of where BACnet is headed, I encourage you to explore the full article.

Exploring Emerging Solution Architectures

For an interesting example of emerging solution architecture check out the article titled "Rapidly Building a Secure Framework to Manage BMS Data." The author explores the requirements and potential architectural solutions for **onboarding, operation and optimization** of building automation systems, especially across multiple sites. As the title suggests, it also delves into the critical question of cybersecurity within the hybrid model of in-building controls and cloud-based user interfaces and analytics platforms.

Expanding Opportunities for BACnet

The ever-evolving technology landscape and industry requirements continue to expand opportunities for BACnet. One particularly intriguing opportunity arises from the rapid adoption of cloud solutions and the exponential growth of AI platforms. These trends drive an insatiable demand for computing power, leading to a projected **10% (US) growth in data centers** continuously through 2030 accompanied by increasing server rack density. Given that a hyperscale **data center can use as much energy as 80,000 homes**, there is a clear need to make data centers more sustainable. Where there is a need there is an opportunity and the article "BACnet and Data Center Sustainability" outlines the BACnet opportunity in this challenge. The author walks us through the problem and describes how BACnet can facilitate advanced solutions to address this challenge.

Celebrating BACnet Champions: History and Future Coming Together

The article titled, "A Recap of the 2024 AHR Expo" includes a report on the **2024 BACnet International volunteer awards**. With awards like Hall of Fame and Rising Star, it's a place where BACnet's rich history and its promising future come together. And a rarely seen yet critically important element in both was honored with a new award this year – the **Supporting Cast Award**. Discover the story behind this award and why its inaugural recipient was Kathy Corcelius, the beloved wife of Steve Busby, himself a former BACnet International Hall of Fame Award winner.

Closing Thoughts

As I look through this Journal, I am struck by the remarkable vision of BACnet's original designers. Their creation has matured and adapted over the years while seamlessly aligning with the industry's evolving needs. Reflecting on the historical journey that propelled BACnet to its status as the dominant integration platform for building automation, I am not surprised to see the articles in this issue pointing to a long and even brighter BACnet future.

Andy McMillan

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ABOUT THE AUTHOR

Andy McMillan is President and Managing Director of BACnet International, where he works with users and suppliers to expand and enhance the BACnet community. Previously he served as President of a building automation and energy management business unit of Philips Lighting.

BACnet's Role in Data Center Sustainability

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Sustainability has emerged as a paramount concern in data center operations, driven by escalating energy demands and environmental considerations. As data centers burgeon globally, their environmental footprint—particularly in energy consumption and cooling requirements—has become a focal point for innovation. Within this context, the Building Automation and Control Network (BACnet ®) standard is pivotal. Developed by the BACnet Committee, or more formally, SSPC 135 of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), BACnet is the global standard, open protocol for communication within the context of a building.

Understanding BACnet

BACnet is an international standard recognized as EN ISO 16484-5, a European standard (DIN EN ISO 16484-5:2017-12), and a global benchmark for data communications in building automation and control networks. Its primary function is to ensure vendor-independent interoperability among various equipment and control devices across a myriad of building automation applications. By defining clear communication messages, formats, and rules for data exchange, all within the context of a building, BACnet facilitates seamless interaction between disparate systems, making it an ideal protocol for Data Center Infrastructure Management Systems (DCIM) and HVAC Building Systems integration.

BACnet and Data Center Sustainability

Integrating DCIM with HVAC systems through BACnet brings significant opportunity for sustainability efficiency gains. These can be broadly categorized into a common understanding of thermal dynamics, standardized communication, and leveraging predictive cooling.

A Common Understanding of Thermal Dynamics

Just as a BACnet Advanced Operator Workstation (B-AWS) in a Building Automation System (BAS) comprehends the thermal heating and cooling equipment trees of a building, DCIM systems equipped with BACnet can achieve a similar level of understanding within the context of the data center. This deep insight into thermal management allows a more precise understanding of cooling system capabilities, ensuring that they operate only when and where needed, reducing unnecessary energy consumption and enhancing overall efficiency.

Advanced Thermal Mapping

Like a Building Automation System, BACnet-enabled DCIM systems can be used to construct detailed thermal maps of the data center, identifying hot spots, airflow patterns, and areas of inefficiency. These maps can provide a real-time visual representation of the thermal status across the data center, enabling operators to make informed decisions about cooling distribution and adjustments. By understanding the specific thermal characteristics of different zones, cooling can be dynamically allocated, focusing on areas with higher heat loads while reducing cooling in less critical areas.

Communication Enables Analysis

BACnet's highly standardized data communication capabilities allow for continuously monitoring temperatures, humidity levels, and airflow rates. This data can be fed into analytical tools to predict thermal trends, identify potential issues before they escalate, and suggest corrective actions. For instance, if a server rack exhibits higher than normal temperatures, a BACnet-enabled DCIM system can automatically adjust cooling parameters, share information with the BAS, or alert maintenance personnel to investigate the issue, preventing potential overheating and system failure.

Integration with Cooling Systems

BACnet's open interoperability is a key feature that allows BACnet-enabled DCIM systems to seamlessly communicate with various cooling infrastructure components, such as HVAC units, in-row coolers, and air handlers. This integration ensures that cooling resources are deployed effectively, matching the exact requirements of the data center at any given time. For example, in periods of low activity, when heat generation is minimal, BACnet-enabled DCIM systems can scale down requests for cooling, conserving energy without compromising the operational integrity of the data center.

Predictive Maintenance and Optimization

Leveraging integrated BACnet systems for thermal management also opens avenues for predictive maintenance. The building automation systems can identify trends indicating impending equipment failure or maintenance needs by analyzing historical and real-time data. This proactive approach not only enhances the reliability of cooling systems but also optimizes their performance, ensuring they operate at peak efficiency. Regular maintenance based on actual conditions
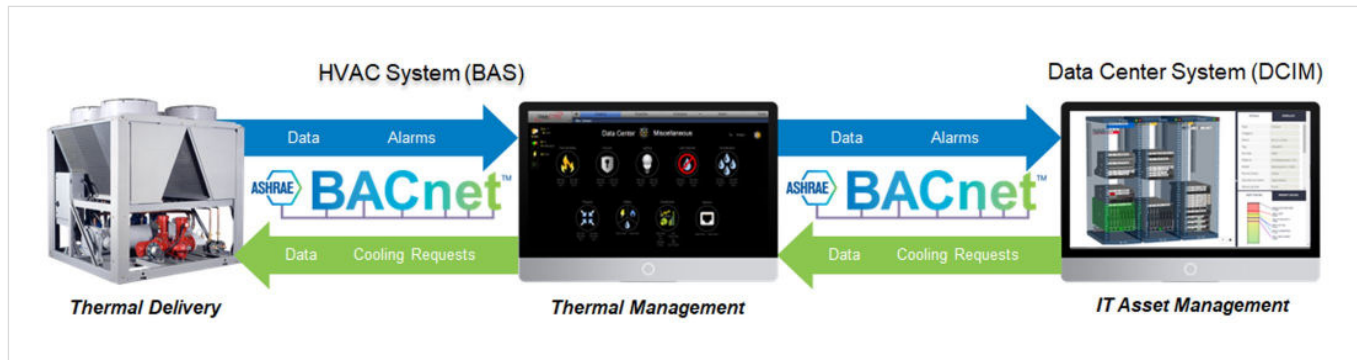
Integrated Data Center Management (IDCM) enabled by BACnet

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rather than predetermined schedules can significantly extend the lifespan of cooling equipment, reduce downtime, and lower operational costs.

Align Cooling with the Workload

In a data-driven world, workloads within data centers can fluctuate significantly, influenced by user demand, computational tasks, and external factors such as time of day or season. One of the most innovative aspects of BACnet-enabled DCIM systems is the ability to implement predictive cooling strategies akin to the "Optimal Start" feature in a traditional BAS. For example, anticipating a high-demand event such as a large-scale data processing task or a significant increase in network traffic. By treating anticipated data workloads from the DCIM system as a building automation system would treat weather forecasts, the BAS can pre-condition spaces in the most energy-efficient manner. This forward-looking approach aligns cooling efforts with workload demands, ensuring that energy consumption is closely matched with actual needs rather than relying on less efficient, reactive cooling methods or fixed setpoints.

Energy Efficiency and Cost Reduction

The strategic timing and anticipation of cooling needs lead to substantial energy savings. By avoiding overcooling during low-demand periods and preventing undercooling during peak times, data centers can operate more efficiently. This reduces energy consumption and operational costs and minimizes wear and tear on cooling equipment, extending its lifespan and reducing maintenance requirements. The energy sav-

ings also contribute to a lower carbon footprint, aligning with broader environmental sustainability goals.

Enhancing Reliability and Performance

Maintaining precise control over the data center environment through predictive cooling and Optimal Start contributes to the reliability and longevity of the IT equipment. By ensuring that temperatures remain within optimal ranges, the risk of overheating and associated equipment failure is significantly reduced. This stable thermal environment supports consistent performance, reduces the likelihood of downtime, and contributes to the overall resilience of data center operations.

The BACnet Advantage

The advantages of BACnet in enhancing data center sustainability are manifold. By facilitating a seamless exchange of information and ensuring interoperability among various systems, BACnet enables a more holistic and efficient approach to data center management. This includes the direct benefits of improved thermal management and energy efficiency and extends to fewer tangible aspects, such as enhanced system reliability, reduced operational costs, and a significant reduction in the environmental impact of data center operations.

BACnet's role in data center sustainability is both profound and multifaceted. As data centers evolve and their energy demands grow, the need for intelligent, integrated, and sustainable management solutions becomes more critical.

With its robust framework for interoperability and communication, BACnet stands at the forefront of this transition, offering a pathway to more sustainable and efficient data center operations. As we move forward, adopting well-defined, open, and continuously updated standards like BACnet will be pivotal in shaping the future of data center sustainability, ensuring that these critical infrastructures operate effectively and in harmony with our environmental aspirations.

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Michael is responsible for marketing strategy and execution to ensure that Nlyte retains its market leadership position for data centers globally. He orchestrates Nlyte's global market messaging, plans and executes SEO/SEM, administers lead generation, conducts product launches, and manages Nlyte's social media presence.

Michael has worked in the building automation and controls industry for nearly two decades and serves as a member of the board of directors of BACnet International, and its Marketing Committee chair. Connect with Michael on LinkedIn: www.linkedin.com/in/mrwilson

Rapidly Building a Secure Framework to Manage BMS Data

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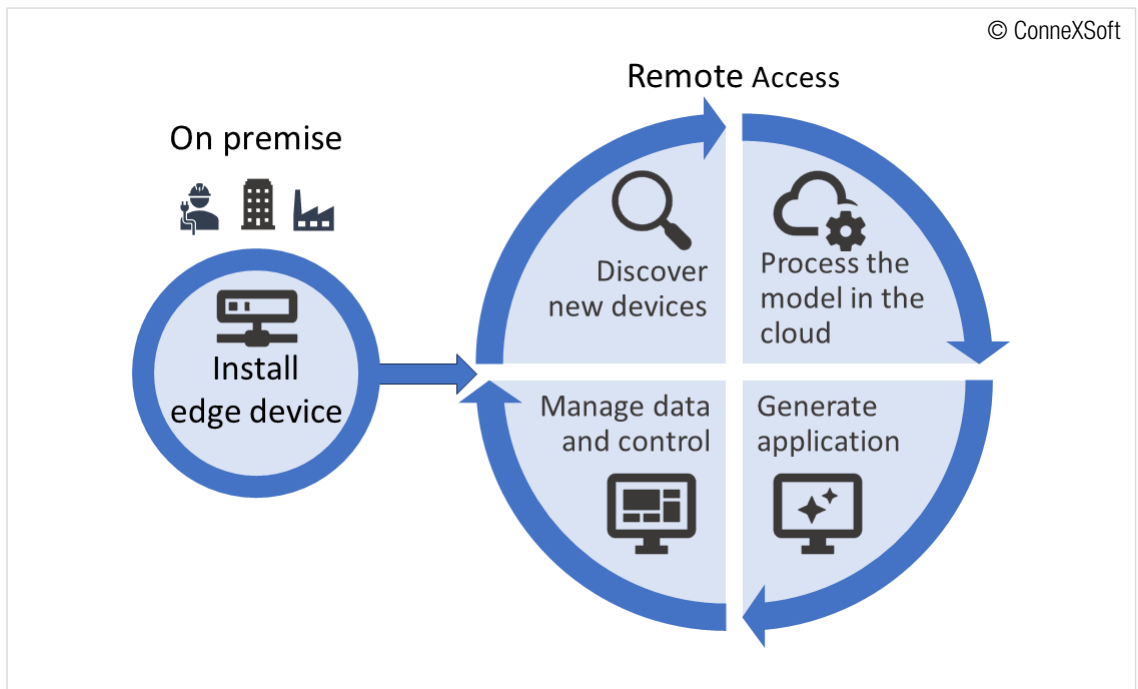
Onboarding workflow
and continuous operation

What if you had a Building Controls System solution which allows you to ship an intelligent Edge device to a location, plug in a few cables and then automatically discover your site application, transport the data securely to a target system where it inflates the Control Center application, locally or in the Cloud, with meta data for Supervisory Control, Data Lake for Analytics, Historization including AI. Once operational, changes in the field are remotely configured and updated, diagnostics are immediately provided for maintenance, all of it with BACnet as the system protocol and functionality of choice.

This article describes how data can be gathered, processed and transferred to and from such systems, developed for customers operating distributed locations, spread out across large geographical areas. Customers who want to be able to monitor and manage their real estate building infrastructure remotely, including but not limited to local and remote Supervisory control and also feeding their analytics and emergency plans.

In practice, Building Automation Integrators typically go through three steps during project lifetime:

1. Onboarding
2. Operation
3. Optimization

ONBOARDING

Modern building applications are expanding beyond on-premise data islands. This is addressed with multi-site Control Centers or Cloud applications. Multi-location data integration has a much higher price tag: travel cost, migrating the local structure into a global namespace, managing expansions, and integrating additional data sources result in more effort and longer target completion cycles. BACnet, with its discovery and modeling capability addresses this challenge. Understanding that BACnet not only provides data and the physical modeling syntax, it also holds valuable semantical information and therefore accelerates application:

BACnet model information:

- Physical model (device, object, property)
- Logical model (structured view, group)
- Specific model, functional model (naming conventions)

Combining this information source into a global unified namespace is the foundation for automatic application building. What are the components required to provide these features? An intelligent Edge device and modern Engineering Tools.

The intelligent Edge device discovers fully automatically BACnet devices, object structure and properties with minimal or no pre-configuration. This is done either in protected network zones with classical BACnet devices requiring the Edge to qualify as an appliance or in BACnet/SC secured networks. Once the model and data are available in the Edge, it needs to be transported securely to the Cloud. Here a receiving counterpart component is needed in the Control Center or Cloud, consuming the data and model. This module is responsible of combining the physical, logical and specific functional model into an application building structure. If the target application has the feature of an API driven object generation, the major part of the Supervisory application can be created fully automatically. This actually fulfills the vision of onboarding a location remotely by just sending an Edge device to the physical Building location.

Required components:

- Edge device
- Application Generator
- Supervisor System with API

Regardless if you want to integrate your data into an Ontology like Project Haystack or Bricks or send it to a Supervisory System via Sparkplug or OPC/

UA, in all cases, cost & completion time can be significantly reduced while creating more robust and manageable solutions. The result is not only increasing integration efficiency, but also providing a normalized data model that contains the meta data for further optimization like AI optimization or machine learning.

Remote onboarding is a paradigm change for the System Integrator. Integration costs are usually underestimated and site access means travel and labor costs. Being able to scan remotely cuts the cost for System Integrators and End User likewise.

OPERATION

If a building automation system is implemented in such manner, it allows for remote management of

- Security
- Maintenance
- Diagnostics, configuration, updates
- Extensibility, adding new equipment without downtime
- Services, leveraging BACnet services

Once the system is up and running, cost of operation is largely determined by the diagnostic and configuration tools available. Since connection to a Control Center or the Cloud is a critical point of attack, all communication must be routed through a highly secured connection. Logging to the Cloud, being notified of new devices, pushing new configuration and/or simply updating components can be done remotely.

However, BACnet is more than data and model, it provides the following services in Edge device and Supervisory System:

- Event information list
- Trendlogs
- Prioritized writes (manual override etc.)
- BACnet schedules

To execute, a Server in the Control Center is needed to consume and forward these services in a specific, normalized form. This Server must provide:

- Alarm management with the original device timestamp and event information
- Continuous (gap free) historical data with original device time stamps
- Direct manual remote control
- Programming and downloading BACnet executed schedules

3- OPTIMIZATION

To gain information from your building data, meta data must be attached for applications like machine learning algorithms or AI, forwarding model data into the Cloud and to AI systems and then being able to map results back to actual BACnet services is used by customers in many ways, like energy and carbon reduction programs. Base data is provided by tight coupling the intelligent Edge device with a Cloud Application Generator component, that processes the unified data model, manages the Edge device remotely and maps the BACnet services.

Building Infrastructure Equipment Controls Devices and Subsystems typically reside in an un-trusted network (common subnet) where the User Interface (HMI) Application Server and Workstations also reside. This is a significant security vulnerability vector, whereas the servers and workstations typically have access to Internet.

The intelligent Edge Device allows for segregation of these two types of devices, control versus user and process computes. It provides a secure encrypted normalized data set supporting BACnet. The bidirectional Command and Control data set is transported to the Edge Server, where it is unpacked and made available to the Supervisory Control Application. This security advantage is coupled with device modeling tools, that allow for rapid replication of similar devices as mapped in the model template, another cost saving.

Such an intelligent Edge device allows the removal of shared Workstations and Servers (threat vectors) from these subnets and redeploying them in their own remote or local Cloud within Owners Managed Server- and User Workstation. The gateway device solution includes the ability to offload the individual installations to a centralized Command and Control environment supporting many BACnet Buildings where the User Interface, Historian, Analytics and now the Operational Technology AI optimization processes exist. This type of device would be considered a Cyber Physical Device by NIST, the method has proven implementations and has undergone penetration testing and is deemed secure and successful.

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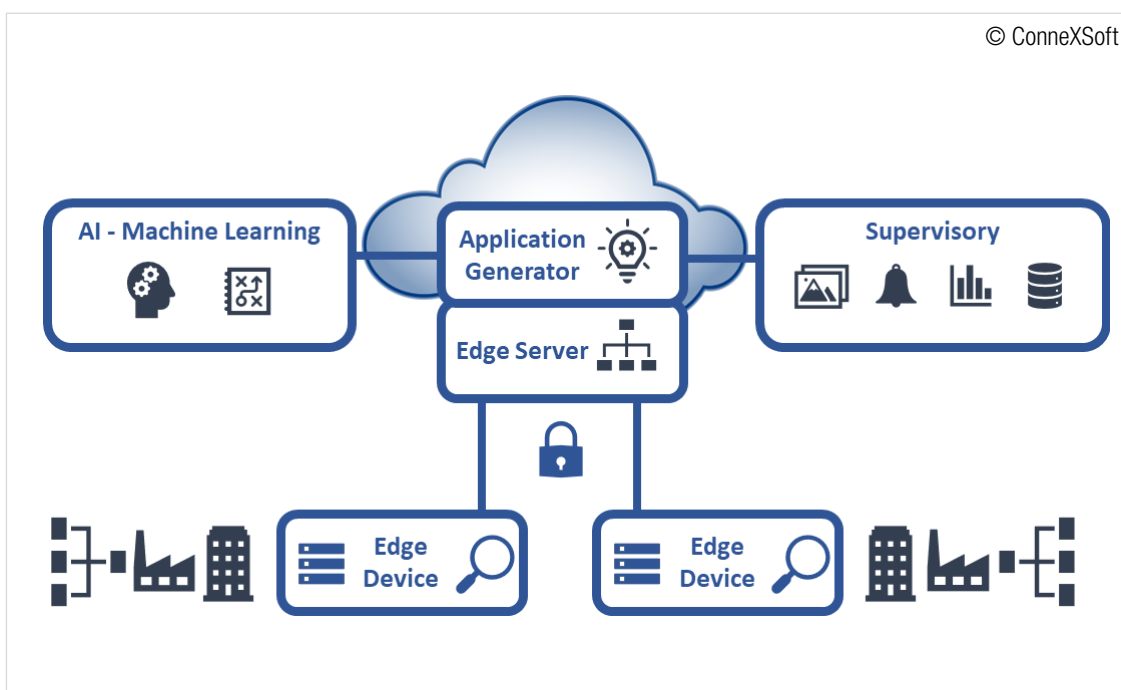
Edge to cloud structure
with unified model

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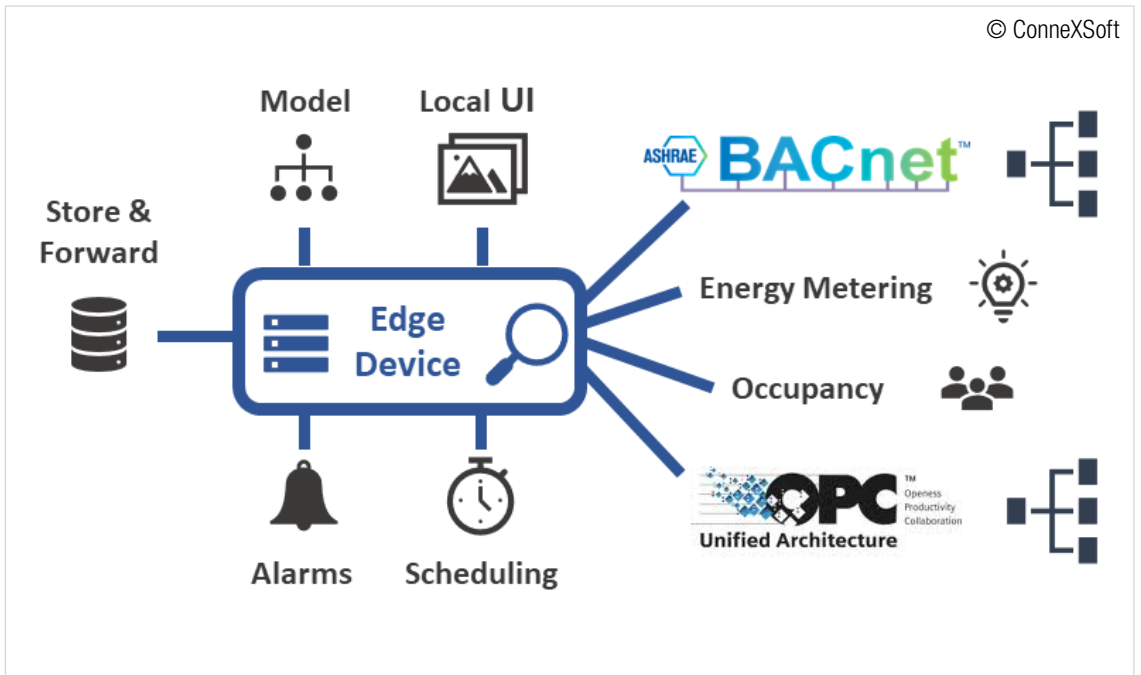
Edge device combining
data sources & services
into a single appliance

CONCLUSION

Many Owners and Facility Management Companies and related Teams are in the process to move their building application to the Cloud, however, moving existing applications to the Cloud is a challenge unless process data are discovered, presented and continuously updated using front end Edge devices. For BACnet, such a framework enables System Integrator and Building operators likewise to streamline the process by automatic application generation and remote onboarding.

It is important to identify and evaluate risk associated with Cyber-attacks and the most likely threat vector to a Building infrastructure Equipment Controls system is the device network or subnet itself

including the fact that these devices are not inherently secure. Any Internet within this network is the pipe to outside intrusion. The method devised in this article is focused on the need for secure network segregation and encrypted data transport of industrial protocols like BACnet to other network segments or domains where the Workstations and Application Servers reside.

The technology provides the SI′s with a toolset to efficiently and securely build the application, Facility Owners gain additional assurance that today's bad-guys cannot compromise their operations leading to lost productivity and costly repairs of equipment or software, while accruing unwanted costs.
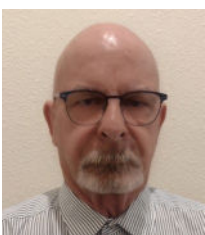
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Mark Lowell Froehlich is a private Consultant in the discipline of Building Infrastructure Equipment Automaton Control Systems for Government, Finance and Science supporting ConneXSoft in their development of BACnet Secure Gateway Devices and Software with Cyber Security and the future of AI in focus.
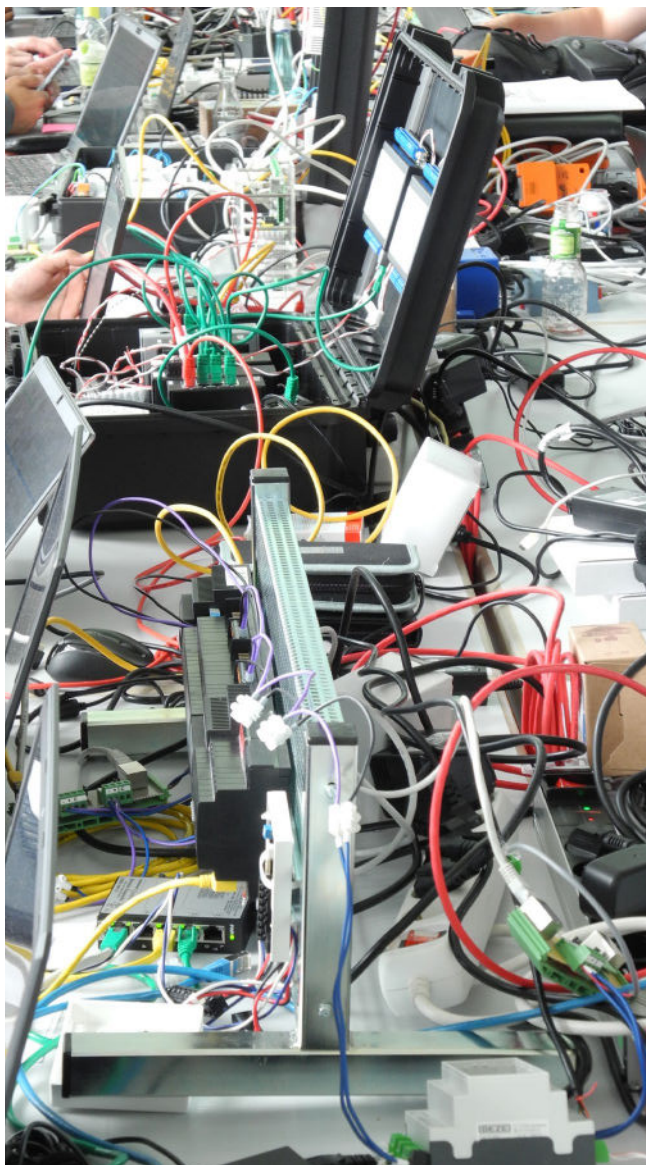
A Recap of the 2024 AHR Expo

BACnet International would like to thank its Corporate Members, volunteers and supporters for another successful AHR Expo. The show drew 48,034 individuals from the H-VAC and building automation industries to the McCormick Center in Chicago. There were 95 exhibiting BACnet International Corporate Members representing 965 BTL Listed products.

BACnet International garnered a strong presence in the building automation pavilion. The booth was well attended by visitors and showcased the educational opportunities of The BACnet Institute (TBI), the advantages of product certification with BACnet Testing Laboratories (BTL), the benefits of the Cybersecurity Acceleration Program, and highlights from the most recent BACnet market adoption study prepared by BSRIA.

Prior to the commencement of the show, BACnet International hosted its annual leadership dinner and reception to recognize several members of the BACnet community for their efforts and volunteerism in promoting the BACnet protocol worldwide.

The awards presented during BACnet International's annual leadership reception and dinner include the BACnet Testing Laboratories Working Group (BTL-WG) Rising Star, BTL-WG Volunteer of the Year, BTL-WG Hall of Fame, BACnet International Project of the Year, BACnet International Rising Star, BACnet International Volunteer of the Year, and BACnet International Hall of Fame.

The BTL-WG Rising Star Award is presented to someone fairly new to the industry and has already contributed to the betterment of the BTL-WG Committee and the BACnet community. This year's award was presented to Deb Barrett, Senior Test Engineer for Current Lighting.

The BTL-WG Volunteer of the Year Award is presented to an individual who has gone above and beyond in giving their time in serving as a volunteer on the BTL-WG Committee and has contributed to moving the committee forward. This year's award was presented to Chris Howard, Senior Test Campaign Leader for Schneider Electric.

The BTL-WG Hall of Fame Award is given to a prolific, long-time contributor to the BTL WG Committee. This year's award was presented to Lori Tribble, Senior Software Engineer for Automated Logic.

The BACnet International Project of the Year Award represents the recognition by the BACnet community of excellence in the design and execution of the BACnet protocol. This year's award was presented to Belimo for their project "Riding the Time of Climate Change". The award was accepted by Salvatore Cataldi, Tom Daenzer, and Dennis Johannesen.

The BACnet International Rising Star Award is presented to someone fairly new to the industry or the BACnet protocol. The recipient contributes to the betterment of the BACnet International association and showed a commitment to the BACnet community.

This year's award was presented to Scott Bissett, Vice President of Sales and Marketing for Armstrong Monitoring.

The BACnet International Volunteer of the Year Award is presented to an individual who has gone above and beyond in giving their time to further the mission and goals of the association. This year's award was presented to Michael R. Wilson, Director of Marketing at Nlyte Software. Wilson is the only individual to receive the award twice.

The BACnet International Hall of Fame Award is given to a prolific, long-time contributor to the BACnet community. The criteria for induction into the BACnet Hall of Fame includes having at least a decade of meaningful contributions to the community, playing a unique and valuable role in the ongoing development of the standard or the community, championing open dialog and a collaborative approach to resolving issues, and demonstrating a global perspective with respect for regional and cultural differences. This year's award was presented to Dave Robin, Founder of BSC Softworks.

This year, BACnet International introduced a new award to its lineup – the Supporting Cast Award. The Supporting Cast Award is unique as it is not given to a member of the BACnet community, but rather their partner. "Year after year, we bestow multiple awards to individuals that have gone above and beyond to further the BACnet protocol and BACnet International. However, we often overlook the partners of these individuals. These partners provide support in multiple capacities helping their partners achieve success within the BACnet

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Michael R. Wilson receives the BACnet International Volunteer of the Year Award for the second time.

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Dave Robin receives the BACnet International Hall of Fame Award.

community," states BACnet International President Andy McMillan. "This is why the Supporting Cast Award is so important. It recognizes the unsung work of the partners."

The first recipient of the Supporting Cast Award is Kathy Corcelius, spouse of Steve Bushby, Leader, Mechanical Systems and Controls Group Engineering Laboratory, NIST. "We greatly appreciate Kathy's contributions to the BACnet community," says President McMillan. "We look forward to honoring many more partners with the Supporting Cast Award."

"BACnet International is proud to recognize the talents and achievements of its leaders and volunteers," states President McMillan. "We are fortunate to have an exceptional community of professionals committed the growth and overall success of the BACnet protocol."

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Kathy Corcelius receives the Supporting Cast Award.

BACnet International also hosted several education sessions at the AHR Expo. These sessions included:

- BACnet 101: An Introduction to BACnet, presented by Edward Tom, Yaskawa America
- Compliance as a Catalyst: Regulatory-Driven Sustainability in Data Centers, presented by Michael Wilson, Nlyte Software and Enzo Greco, Nlyte Software
- BACnet Global Community Outlook (2024-2029), presented by Andy McMillan, BACnet International, Hans Symanczik, BACnet Interest Group Europe, Jeremy Towler, BSRIA, Michael Osborne, SSPC 135 Committee, and Sakhee Chandrayan, INBAC Association
- Securing the Smart Building with BACnet/SC, presented by Dave Robin, BSC Softworks and Nate Benes, University of Nebraska – Lincoln
- BACnet International Guide Specification for Lighting System Integration into the Facility BAS, presented by Grant Wichenko, Appin Associates
- BACnet in the Cloud, presented by Ken Gilbert, Automated Logic
- Web Services. What they are and why they matter., presented virtually by Coleman Brumley, Passive Logic and SSPC 135 Committee Chair

These recorded presentations can be found on TBI's Resource Library. We look forward to next year's show in Orlando, FL to celebrate the 30th anniversary of BACnet being an ASHRAE Standard.

Create a FREE TBI account.

View BACnet 101: An Introduction to BACnet on TBI

View Compliance as a Catalyst: Regulatory-Driven Sustainability in Data Centers on TBI

View BACnet Global Community Outlook on TBI

View Securing the Smart Building with BACnet/SC on TBI

View BACnet International Guide Specification for Lighting System Integration into the Facility BAS on TBI

View BACnet in the Cloud on TBI

View Web Services. What they are and why they matter., on TBI

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Mary Catherine Heard joined BACnet International in 2022 bringing a decade of marketing experience that includes website management, email marketing, social media, copywriting, and graphic design. Prior to joining BACnet International, she worked in the auto industry and state government.

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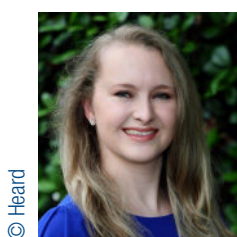
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BACnet International

BACnet Global Community Outlook: The future of the BACnet protocol as it approaches 30 years

During this year's AHR Expo in Chicago, BACnet International President and Managing Director Andy McMillan moderated a panel discussion with several industry leaders on the BACnet protocol's expansion and future outlook across the global landscape. Next year will mark the 30th anniversary of the BACnet protocol as an ASHRAE Standard. President McMillan opened the panel discussion with updates on the SSPC 135 Committee, The BACnet Institute (TBI), and BACnet Testing Laboratories (BTL).

The SSPC 135 Committee maintains the BACnet standard on a quarterly basis. The standard has evolved with several addenda added to ASHRAE 135 BACnet 2020. These updates include lighting control enhancement, color and color temperature support in lighting, schedule function enhancement, message segmentation enhancement, and configuration support for BACnet/SC.

President McMillan highlighted the growth of TBI, a free, central learning environment that provides three courses and a breadth of resources for industry professionals to learn about BACnet. The online portal currently has over ten thousand registrants with over 40% outside of North America. Due to the increased global interest in the BACnet protocol, over 1,300 individuals completed the BACnet Basics course in 2023. Registrants have the opportunity to earn CEUs and PDHs with TBI courses.

Additionally, BACnet product suppliers have also increasingly recognized the need for independent compliance testing and certification through BTL. BTL Certified products that have successfully completed testing and certification are listed in the BTL Product Listing Database on btl.org. Since 2021, 38 new suppliers have obtained listings in the BTL Product Listing Database. The database currently contains 1,365 products from 227 manufacturers.

Hans Symanczik, a representative for BACnet Interest Group Europe (BIG-EU), discussed current energy management regulations and directives in Europe, specifically the European Performance of Buildings Directive (EPBD), the European Union's Cyber Resilience Act, and the European Green Deal.

BACnet International President Andy McMillan discusses the global outlook of the BACnet protocol.

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Symanczik's presentation highlighted the specifications required under the most recent EPBD. The EPBD covers digitalization, e-mobility, self-regulating devices, continuous monitoring and smart readiness indicators. Germany recently adopted this directive into national law containing the following requirements:

1. Non-residential existing buildings with a heating or air conditioning system with a rated output of more than 290 kilowatts must be equipped with a BA system with automation Class B or better by the end of 2024. Class B indicates an extended building automaton system with some special technical building management functions and is derived from ISO 52120.
2. Energy monitoring technology must be introduced that makes the data available through a common and freely configurable interface.
3. Non-residential buildings with an existing BA system of automation Class B or better must demonstrate the ability to communicate across manufacturers also by the end of 2024.
4. Communication between the technical building systems and the application must be possible even with different proprietary technologies and devices.

"BACnet will play a crucial role in achieving the objectives of the EPBD by contributing to the creation of energy-efficient, sustainable, and digitally advanced buildings in the European Union," states Symanczik.

BACnet/SC will also play a pivotal role in the European Union's Cyber Resilience Act. The act will place additional cybersecurity requirements on hardware and software products to better protect against threats and attacks. BACnet/SC is a secure, encrypted communication datalink layer that is specifically designed to meet the requirements, policies, and constraints of minimally managed to professionally managed IP infrastructures, making it an important addition to the toolbox of product designers developing more secure building automation products and systems. This extension to the BACnet protocol maintains the interoperability necessary for multiple building automation systems while keeping cybersecurity a focal point. "The EU Cyber Resilience Act, coupled with technologies like BACnet, plays a crucial role in fortifying the cybersecurity landscape and safeguarding critical sectors from cyber threats." says Symanczik.

Symanczik also highlighted the European Union's European Green Deal. The European Green Deal is comprised of policy initiatives that aim to make Europe the first carbon neutral continent by 2050. The interoperability of the BACnet protocol among multiple building systems will allow for increased sustainability and energy efficiency in new buildings.

Sakhee Chandrayan, President of INBAC Association, a non-profit organization driving a community of various stake holders involved in building automation domain in India, gave an update on the country's industry landscape. She discussed the most recent G20 Summit hosted in New Delhi. India prioritized the following issues during the summit: green development, climate finance, accelerated and resilient growth, accelerating progress on sustainable goods, technological transformation and digital public infrastructure, multilateral institutions for the 21st century, and women-led development.

INBAC's goals align with focuses of the summit in that the organization promotes open communication protocols, like BACnet, as the foundation for smart spaces. The organization focuses on multiple growth drivers for smarter buildings include decarbonization and energy optimization, the comfort and safety of occupants, real estate investment trust and immune buildings. The organization serves as an important bridge to India's building automation market.

Last year, BACnet International released updated BACnet Market Adoption Report, drawn from the BSRIA's Market Penetration of Communications Protocols 2018 – 2027 market research study. BSRIA is a premier provider of market intelligence in HVAC and Building Automation and Control (BACS). This study is a follow up to BSRIA's 2018 study titled "Market Penetration of Communications Protocols". Jeremy Towler, Senior Market Intelligence Consultant for BSRIA, presented several findings during the panel session.

According to BSRIA research, BACnet is the leading protocol with 77% of projects specifying BACnet worldwide. Growth of the protocol is fueled by multiple drivers including environmental, social, government regulations, sustainability, workforce satisfaction, energy efficiency, cybersecurity and digitalization. Out of BACnet, KNX, LonWorks, Modbus and proprietary protocols, BACnet is the only protocol forecasted to make significant market share gains over the next several years.

Towler gave insights on the protocol market share by region. Currently, BACnet holds 95% of the North American market, 83% in Latin American, 67% in the Middle East, 65% in Europe and 62% in Asia Pacific.

In addition to market analysis by region, Towler also gave a breakdown on each protocol's market by controller type. BACnet is specified in 79% of building controllers, 81% in HVAC controllers and 72% in room controllers.

The BSRIA research included communication protocol share information in India. Currently, BACnet has a 61% overall market share with BACnet/IP holding 38% and BACnet MS/TP holding 23% of the market. BACnet is forecasted to dominate India's market with a 70% share with BACnet/IP forecasted to increase its share to around 49% by 2028.

BTL Technical Advisor Michael Osborne delivered an update on the recent and future happenings of the SSPC 135 Committee. In 2024, the committee will publish multiple addenda as Protocol Revision 26 including:

- bx – Device Address Proxy
- ch – Segmentation Fixes
- ci – Various Improvements
- cj – Lighting Extensions
- ck – Correct ASN.1 datatypes
- cn – Clarify Engineering Units
- co – Clarify Reliability Evaluation
- cq – Short form of Arrays and Lists in JSON

The Authentication and Authorization addendum (Addendum cp) adds identity (authentication), and permissions (authority) to BACnet/SC. This addendum allows a device to accept or reject a request based on the identity and permission of the device doing the request. This addendum is currently going through its second public review.

The file format introduced in Addendum cs provides a much-needed interoperable method to exchange Certificate Signing Requests (CSRs) and the corresponding certificates between a BACnet/SC device and a Certificate Authority (CA). The file format provides a link between a CSR and its device identifier and is required for the 'identity' component of Addendum cp.

To further assist in the adoption of BACnet/SC, BACnet International has developed and released an Alpha version of the BACnet Certificate Authority Reference Implementation (BACCARI) tool. This tool allows suppliers to validate existing CSRs or generate new ones and to package these CSRs into the file format specified in Addendum cs. BACCARI includes a Certificate Authority (CA) that reads the package of CSRs, generates the required certificates, and uses the Addendum cs file format to package the certificates for the supplier. For enhanced site security, BACCARI includes a suite of security measures and built-in users access levels. A Beta version of BACCARI will be available in Q2 of 2024.

The valuable insights presented in the BACnet Global Community Outlook demonstrate that the BACnet protocol will continue to transform the building automation landscape and shape the configuration of smart buildings. Next year, the BACnet protocol will celebrate its 30th anniversary of being an ASHRAE Standard. A full recording of this presentation can be viewed on The BACnet Institute's (TBI) Resource Library. ◆

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Mary Catherine Heard joined BACnet International in 2022 bringing a decade of marketing experience that includes website management, email marketing, social media, copywriting, and graphic design. Prior to joining BACnet International, she worked in the auto industry and state government.

BACnet International releases Lighting System Upgrades to the BACnet International Guide Specification

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BACnet International needed a BAS vendor-neutral BACnet Specification so that BAS Designers would have a tool with which they could create BAS specifications that could be part of a MasterFormat Division 23 or Division 25 Specification. BACnet International approached Grant Wichenko, Appin Associates, to create these guide specification documents.

Wichenko used three of the publicly available Whole Building Design Guide (WBDG) Specifications to create the BACnet International Guide Specification documents:

1. Section 23 09 00: Instrumentation and Control for BACnet-based HVAC and other systems
2. Section 23 09 23.02: BACnet Building Automation Systems (BAS) control for HVAC and other building control systems
3. Section 25 10 10: Facility Monitoring and Control System (FMCS) BACnet-based front end and integration

The numbering systems in the original WBDG documents were retained so BAS Designers who may be familiar with or who are currently using these documents could easily see what changes were made. The documents were also enhanced with explanatory notes so a BAS Designer would understand the purpose of each guide spec clause.

Wichenko is a voting member of ASHRAE SGPC 13 BAS Guideline Specification Committee. This committee maintains and updates the ASHRAE Guide Specification. A new version of this document is being released this year.

The SGPC 13 document has been written to be protocol neutral. BACnet International's Guide Specification documents are specifically tailored to the BACnet protocol. The two documents are therefore complementary. The SGPC 13 document can be purchased through ASHRAE.

The BACnet International Guide Specification was initially released at the 2023 ASHRAE Winter Meeting in Atlanta. The next work item was to add in information about how to specify a BACnet-based lighting system. These upgrades were released at the 2024 ASHRAE Winter Meeting in Chicago.

Lighting systems were chosen as the next building system to address with a guide specification as they contain a wealth of energy and device status information.

This information can then be used track energy consumption for compliance with LEED, NetZero, CA Title 24 and other requirements, thus eliminating the need for additional metering. The HVAC system can use lighting system occupancy/vacancy sensor information to achieve part load energy savings in unoccupied rooms in a facility implementing the CA Title 24 standby occupancy requirements.

Facility managers want to be able to control their lighting and other systems to meet the occupant requirements. The BACnet protocol allows facility managers to provide these needed services.

Historically, BAS Designers have been responsible for the HVAC systems (AHUs, boilers, chillers, etc.) controls only. Many BAS Designers are also mechanical engineers who design these systems.

BAS designers normally do not undertake the

design of the lighting system or other non-HVAC systems such as fire alarm, switchboards, UPSs etc.

The BACnet International Guide Specification documents therefore assume that the lighting system itself will be designed by the designer of record, normally the electrical engineer, on the project.

The guide specification documents only cover how to specify the integration of the given lighting system design into the BACnet internetwork for the facility. The documents do not provide information on how to design and specify a lighting system.

The guide specification documents provide explanatory language on how the BAS designer and the electrical engineer, the lighting system designer of record, can work together to ensure that the BACnet components for the lighting system are properly specified so the work requirements are clear to the contractors responsible for building the project.

Finally, users of this version of the lighting system enhancements to the BACnet International Guide Specification need to understand that the spec language is currently written to use only standard BACnet objects (AVs, BVs, MSVs) and BACnet services (ReadProperty and WriteProperty) to represent lighting system devices on the BACnet Internetwork in the facility, base, or campus.

The BACnet Standard has been upgraded several years ago to provide lighting-specific objects (the Lighting Output Object Type) and services (WriteGroup).

BACnet equipment vendors are in the process of upgrading their hardware and software to meet these lighting system specific upgrades.
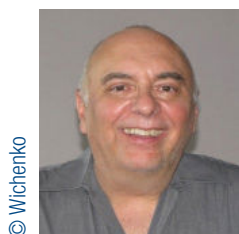
When this work is done and these new objects and services are widely supported, BACnet International will upgrade the three guide specs to include these lighting system-specific BACnet objects and services.

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Grant Wichenko is a Professional Engineer. He is a member of:
- ASHRAE SSPC-135 (BACnet committee – voting member),
- SGPC-13 (BAS Guideline Specification committee – voting member)
- ASHRAE 201P (SmartGrid committee - member.)

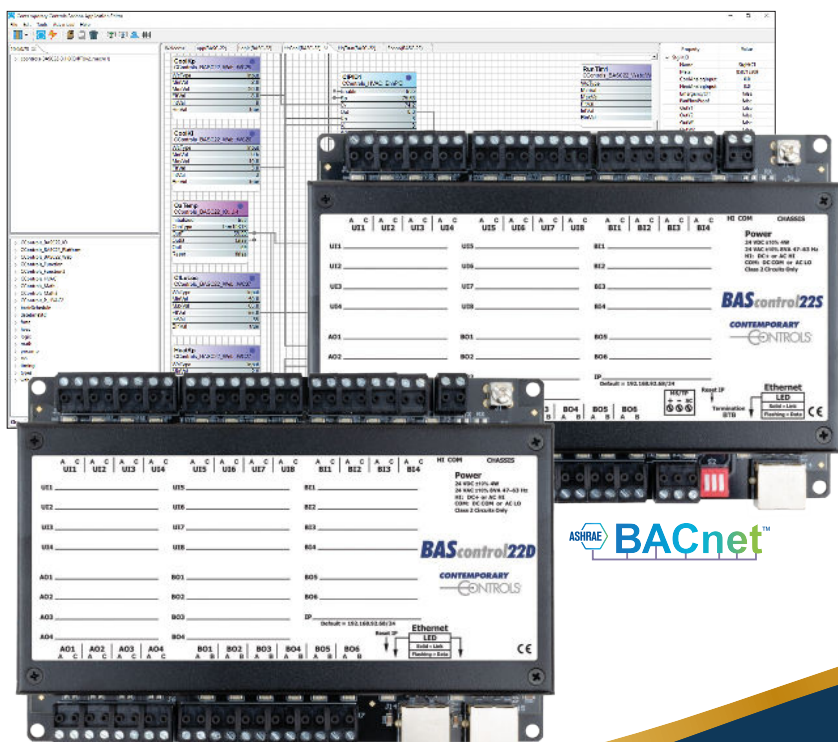Appin Associates was the first engineering firm in the world to join BACnet International in 1999.

Deploying BACCARI

BACCARI – The BACnet Certificate Authority Reference Implementation Tool is an example implementation of a Certificate Authority for BACnet Secure Connect. This tool allows suppliers to validate device Certificate Signing Requests (CSRs) or generate new ones and to package these CSRs into the file format (CARI) specified in Addendum cs. BACCARI includes a Certificate Authority (CA) that reads the package of CSRs, generates the required certificates, and uses the CARI file format to package the certificates for the supplier.

BACnet International released the Alpha version of BACCARI on February 6th, 2024. This version contained all the functionality necessary to allow program participants to validate the implementation and review the underlying technology. The Beta version of BACCARI is close to completion and contains all the planned functionality including an updated workflow and user interface, the addition of user credentials, and support for multiple deployment scenarios.

BACCARI can be installed as standalone software running on Windows, Linux, or macOS or as a web server either on-site or in-the-cloud. A subset tool of BACCARI called 'Builder' is also available as standalone software. This subset tool is limited to generating and validating CSRs and building the CARI compatible file containing the CSRs.

How BACCARI is deployed on a site depends on the size of the site, the number of different suppliers, and the owner's security requirements.

Deploying BACCARI as standalone software works well on small sites where a site manager can manage the device certificates for the different suppliers on the site.

Deploying BACCARI as a web server and allowing suppliers to login to the tool, upload device CSR files and, once approved by the site manager, download the appropriate certificates is an efficient method to manage a large site with multiple suppliers.

Alternatively, the 'Builder' component of BACCARI can be used independently by each supplier to generate the CARI compatible file containing the CSRs. These files can be delivered to the site manager for approval and the subsequent certificates returned to the supplier.
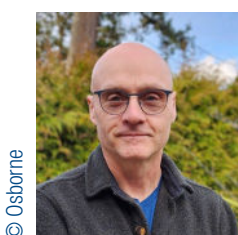
About the Cybersecurity Acceleration Program:
Designed for manufacturers, BACnet International's Cybersecurity Acceleration Program aims to reduce their cybersecurity implementation learning curve and align their product development with industry direction on interoperability and best practices. The program includes reference implementation and source code components including: a Certificate Authority (CA) server, a Certificate Signing Request (CSR) generation and validation tool, and a machine readable, interoperable certificate file format. Additional program features include Cybersecurity implementation webinars, early tool release with full source code license, an expert moderated developer's forum, and the manufacturer's cybersecurity guidelines document development. For more information, visit: https://bacnetinternational.org/cybersecurity/ or contact David Nardone, Membership and Education Manager, at david@bacnetinternational.org.

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Michael Osborne has over 35 years of experience in various aspects of the high-tech industry. For the last 19 years, Michael has designed building automation products, managed technical projects, and supervised a team of talented developers. For most of his time in the building automation industry, Michael has also been involved in the BACnet community where he developed tests for the ASHRAE 135.1 Testing Standard and wrote proposals for the ASHRAE SSPC 135 Standard. From 2012 to 2021, Michael was the Secretary, Vice-Chair and finally Chair of the ASHRAE SSPC 135 Committee.

Has your BACnet product achieved BTL Certification?

*The BTL Listing of Tested Products contains over **1,375 products** from over **225 manufacturers**. BACnet products that have successfully completed compliance testing are eligible for BTL Certification and are listed in the BTL Listing of Tested Products.*

Benefits for User and Building Owner/Operators:

Lower Integration Cost
BTL Certified products accelerate and lower the cost of system integration. As such, it is becoming commonplace for specifications to require BTL Certification to be eligible to bid on a project.

Less Integration Risk
Reliance on BTL Certified products lowers the risk of integration problems and the project delays and cost-overruns. Also provides a solid foundation for future system enhancements and extensions.

Assurance of Independent Testing
BTL Certification provides users with assurance that a product has passed the industry standard BACnet conformance tests conducted by a Recognized BACnet Testing Organization (RBTO).

Interoperability Assurance in a Multi-Vendor Environment
The tests are designed to validate that the product correctly implements a specified set of BACnet features to ensure that the products integrate seamlessly.

Benefits for Manufacturers:

Improved Product Quality & Performance
The rigorous testing associated with BTL Certification is a powerful methodology for ensuring such errors are found and eliminated before a product reaches the market.

Reduced Costs & Liability
Earning the BTL Certification reduces the risk of BACnet implementation errors causing interoperability problems and minimizes the associated costs.

Greater Buyer Confidence & Opportunity to Bid
BTL Certification provides buyers with assurance that a product has passed the industry standard BACnet conformance tests conducted by a recognized, independent testing organization. This increases buyer confidence in both the product and its manufacturer.

Learn more about BTL Certification and join the ranks:

PlugFest Interoperability Workshop

PlugFest is an annual interoperability workshop hosted by BACnet International that allows vendors to test their products in a friendly and neutral environment and provides opportunities to improve BACnet implementations and testing methods. **Corporate Members and BACnet International volunteers receive a significant discount on registration.**

- ⬡ Test your BACnet products in a friendly and neutral environment and fix implementation errors before they are found in the field
- ⬡ BTL Technical Advisor onsite to assist and answer questions
- ⬡ Education opportunities available
- ⬡ Network with fellow engineers and developers

Join us September 24th - 26th
University of New Hampshire's Interoperability Laboratory
Scan for more information and registration:

Developing a BACnet product? Save time and money by pre-testing it at PlugFest!
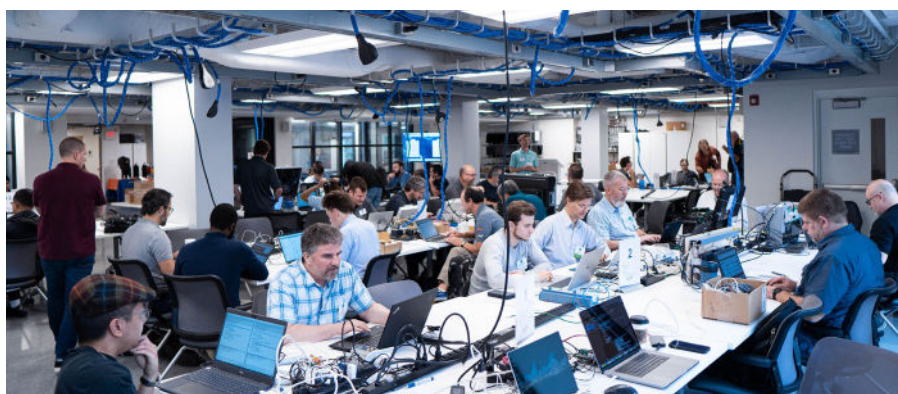
Attendees test the interoperability of their BACnet products.　　　　　© BACnet International

BACnet International annually hosts a PlugFest Interoperability Workshop to give manufacturers an opportunity to test the interoperability of their BACnet products against the products from other attending companies.

The workshop is a friendly and neutral environment with the goal of improving the overall quality of BACnet products in the market. PlugFest includes multiple testing sessions with both one-on-one and round table testing as well as networking events to build industry relationships. Various educational opportunities and industry presentations are also components of the event.

"PlugFest gives us a great opportunity to find bugs that you can't find with a desktop tool. You get to test in quasi real-world environments, and it allows you to test your product before you get into the field with it," states Coleman Brumley, Passive Logic and SSPC 135 Committee Chair.

The workshop is open to engineers, technical product managers, and hardware, firmware and software developers. Workshop attendees range from those newer to the industry to veterans with many years of experience. Attending companies range from newer companies with a single BACnet implementation and very little experience in the world of BACnet to veteran companies with dozens of products and decades of experience.

"The cordiality is one of my favorite aspects about PlugFest," says Brumley. "People are more than willing to sit down and talk to you and help one another with very highly technical questions. It's a chance to interact with our peers that we do not get in the office." The BACnet Testing Laboratories' Technical Advisor will also be onsite to assist with questions about testing and implementation.

To provide the best testing experience, the one-on-one sessions will always pair one or more servers with a client. Companies are also allowed to provide preferences on which company's products they would like to test with.

"PlugFest has been beneficial to our team. It's good experience to just work with other vendors to get a sense about how they do their implementations. We do find issues and see that there are different ways of doing things. It's pretty definitive to find issues in this type of environment, rather than finding them in the field," says Chris Howard, Schneider Electric, Member of the SSPC 135 Committee and BACnet Testing Laboratories Working Group. "Normally we would never see these other products in our test lab, but integrators in the field do put these products together. This is an opportunity for us to find those types of interoperability issues."

The workshop is a neutral environment. To protect intellectual property, companies only share information necessary to interoperate with other products and diagnose any issues that arise. To protect sensitive information, all attendees are required to sign a non-disclosure agreement designed to ensure confidential information shared at PlugFest, remains confidential.

In addition to one-on-one testing sessions, attendees have the opportunity to collaborate in round table testing. This gives attendees the opportunity to arrange their equipment on a larger Local Area Network (LAN) and test with multiple manufacturers simultaneously. Round table testing provides a more robust simulation of the interoperability environment that products will encounter in the field. BACnet/SC is one of the round table test sessions at PlugFest and is moderated by a BACnet/SC expert.

This year's PlugFest Interoperability Workshop will take place September 24th – 26th at the University of New Hampshire's Interoperability Laboratory. BACnet International Corporate Members in good standing will receive a $450.00 USD discount off of the non-member rate of $1,200.00 USD. There is a $50.00 USD early bird registration discount as well. Any individual who volunteered with BACnet International in 2023 will receive a $50.00 USD discount. This discount can also extend to their colleagues, even if their colleagues did not volunteer.

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From the "Tin Lizzie" to efficient building operation

Standardization makes life easier. Anyone who has ever tried to connect a Europlug to a US NEMA socket will agree with this statement. This has also long been recognized in building automation, as demonstrated by the BACnet standard gaining an ever-greater market share. This benefits device manufacturers and property operators alike.

One wonders whether Henry Ford had any idea of how the production of his "Tin Lizzie" would influence technological development around the world. When the first automobile rolled off the assembly line in Michigan in 1908, a revolution in vehicle construction began. Meanwhile, shorter production times and lower costs were made possible mostly thanks to the standardization of manufacturing processes. This model became a blueprint in the automotive industry and many others due to the many benefits brought by standardizing components, processes, communication protocols and services.

Global key technology

An obvious example of this in building automation is the BACnet bus protocol, which has become a global standard. In Germany and Europe, DIN EN 13321 and DIN V ENV 1805-1 define this transmission standard for open data communication. As the international standard ISO 16484-5, it is used internationally for networking in properties. No wonder BACnet now has a global market share of 78 per cent. It is no coincidence that the standard is regarded as a key technology for efficient building operation.

The reasons for this are as varied as they are convincing. It has been proven that a standardized approach principally allows faster production at a lower cost. At the same time, the quality of production can not only be improved but also guaranteed because the checking of results can also be standardized. This results in a reliable product which can be delivered within a shorter timeframe.

Interoperability offers benefits

When applied to building automation, this means that devices with BACnet can be integrated into properties more quickly than those with a proprietary transmission protocol, which first has to be adapted to the user's specific circumstances. BACnet provides the requisite interoperability in a device landscape consisting of several manufacturers, different communication protocols and different trades. This is particularly attractive for large properties because the manufacturer-independent standard creates the basis for standardized data exchange between field devices and control technology. If cooling and ventilation, lighting and shading can be sensibly combined, the energy used can also be controlled more efficiently. Furthermore, use of BACnet reduces the need for employees with specialized knowledge. Integration is faster, while support requirements and downtimes are reduced. This creates more flexibility and competitive advantages.

However, standardization sometimes reduces variability in the range of functions. For example, there are communication standards for lighting that currently offer more functionalities than BACnet. The protocol is under constant, ongoing development, but it will certainly be a while before there is a larger selection for this special area of application. Until then, the market will provide sophisticated components with BACnet interfaces as "interpreters" for exchanging data packages between different network structures.

Application safety through certification

Another objection is that the BACnet products – being part of the standard – should be tested. However, on its face, this is just the other side of the coin. To allow the advantages of the standard to be fully utilised, a device should be certified and therefore be safe to use. Although this results in slightly higher production costs, property operators benefit from significant cost savings thanks to the simplified commissioning. In addition, they are not restricted to individual suppliers for new purchases.

Manufacturers, on the other hand, can rest assured that their products will work with other BACnet devices because they function according to the standard. Secondly, once installed in a building automation system, a successfully tested device communicates with other (also certified) devices out of the box. Lastly, this significantly reduces support costs. Certification also improves manufacturers' competitive positions, as most public tenders often require proof of conformity from an accredited BACnet test laboratory.

Optimized security

The global standard also has a lot to offer in terms of security. The growing use of company-wide IT structures and cloud-based applications in building automation necessitates increased protection of communication. This applies all the more to facilities that have to guarantee security of supply and that could previously only be secured at great expense. This is where BACnet Secure Connect (BACnet/SC) can significantly minimize risks through access restriction, authentication, authorization and encryption.

In Europe, BACnet celebrated its 25th anniversary last year. In the USA, standardization efforts began a few years earlier. The relevant committees are made up of experts who have been overseeing use and improving and developing the standard for many years. As a result, the manufacturer-independent network protocol offers investment security, operational safety, faster commissioning, reduced operating costs and increased energy efficiency. In order to make full use of this, it is worth looking out for products and services that are available on the basis of this expertise.

A Few Steps to an Energy-Efficient Existing Building

© Delta Controls Germany

A few steps to an energy-efficient existing building.

Increasing the energy efficiency of existing buildings is a major challenge for the entire real estate sector.

While structural measures are often associated with high investment costs, the digitalization of building services is an excellent way to quickly and effectively reduce primary energy requirements. This is also reflected in Gebäudeenergiegesetz (GEG) 2024, which takes up this opportunity and makes the retrofitting of building automation to the high level of "automation level B" in accordance with DIN V 18599-11 mandatory for many non-residential buildings.

Specially developed for the challenges of existing buildings

The O3 Edge stand-alone multi-sensing controller with EnOcean wireless technology is the main component of the digitalization solution from Delta Controls. Positioned on the ceiling, it records the ambient conditions in the room with the integrated sensor technology. Thanks to the wide range of retrofittable EnOcean wireless components, the most important systems such as heating, sun shading and lighting can be integrated directly into the O3 Edge without the need for cabling. Universal inputs and outputs are also available on the device, e.g. to connect air quality sensors or a recirculating air cooling unit. The interface to the room users is the new Seymour app, which communicates with the O3 Edge. Additional control technology for room automation is not required, as the O3 Edge is freely programmable. Thanks to native BACnet communication, interoperability and connectivity to the system automation are a matter of course.
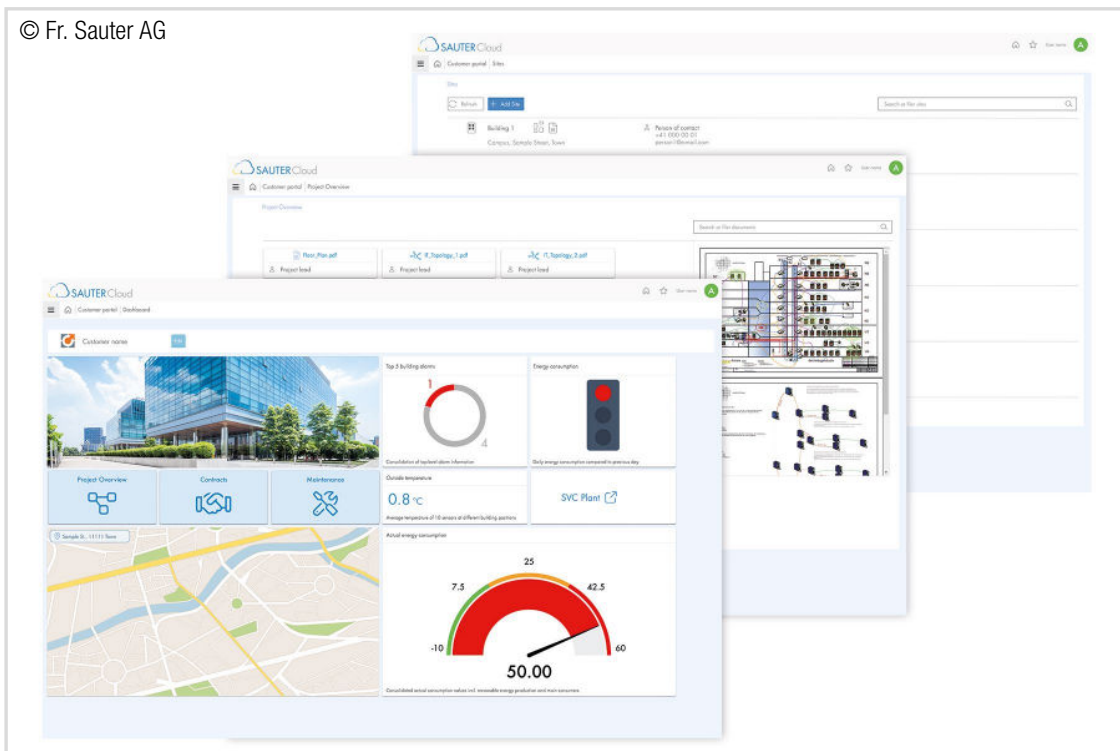

O3 Edge stand-alone multi-sensing controller.

Delta Controls Germany GmbH
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Building and Service Overviews in the Cloud

© Fr. Sauter AG

All information, system documents, contracts and invoices are centralised in one portal.

SAUTER is expanding its cloud-based and digital service capabilities, enabling the digital transformation of building management.

Connectivity + Digital Services = Smart Building. Behind this equation lies the continuous, location-independent availability of building data, early automatic alerts for deviations from normal operation and intelligent remote access options. This not only sounds smart but also leads to simplified processes in building management. Furthermore, it results in increased room comfort, improved risk management, optimized system availability and an all-round increase in efficiency.

New: SAUTER Customer Portal

SAUTER's Customer Portal presents a comprehensive overview of the performance of technical systems (including lighting and air quality) and energy costs. Building and Asset Managers receive consolidated information about their properties. It also makes the management of plant documentation and service contracts clearer and significantly easier. Thus, the Customer Portal improves risk management and provides transparency for different types of properties, including individual buildings, dispersed premises, large building complexes and industrial areas.

The Customer Portal and its services are part of the custom service packages offered by the sales organizations of SAUTER. With digital service concepts and cloud solutions, SAUTER assists customers in reducing building costs, increasing attractiveness for users, and enhancing the value of the property.

# Secure Building Automation with BACnet/SC

Enable end-to-end encrypted communication via BACnet/SC with the certified B-AWS OPENweb (BMS) and the OPEN. WRX AS controller, at automation and management level.

Everyone knows them – cyber attacks are unfortunately now part of everyday life for many companies. Despite all security measures, attackers manage to penetrate company networks time and again. Once attackers have gained access to a network, all information can often be tapped or influenced so that, in the worst case, communication is no longer possible. Thanks to the new, secure BACnet/SC protocol, these concerns are now a thing of the past: Due to the 100% compatibility to already existing BACnet/IP or BACnet MS/TP networks, it is possible to encrypt the approx. 25 million installed BACnet devices worldwide. Complicated BBMD configurations, static IP addresses or unencrypted telegrams are now a thing of the past. With BACnet/SC, segments, networks, buildings or even entire properties can be connected easily and flexibly.

In the summer of 2022, the new DEOS OPEN. WRX controller generation became the first controller worldwide to be BACnet/SC certified. In April 2023, DEOS also obtained BACnet/SC certification for the B-AWS (BMS) OPENweb, making us one of the few MCR manufacturers to offer a complete BACnet/SC solution. The OPEN.WRX controller series as well as the B-AWS (BMS) OPENweb and OPENweb Cloud from DEOS AG are certified for both node connections (simple participants) and hub functionality (B-SCHUB profile) and thus offer the greatest possible flexibility when it comes to designing BACnet/SC networks. The necessary certificates for setting up a BACnet/SC network are also already integrated in both products, which means that a network between BACnet/SC-capable DEOS devices can be established within just a few minutes.
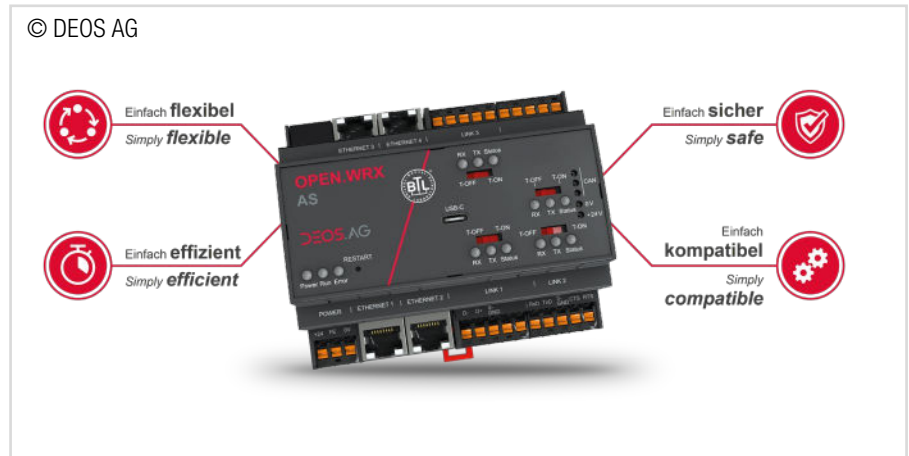
© DEOS AG

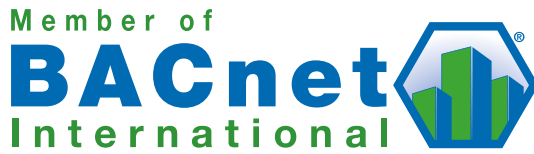Efficient system integration in four steps.
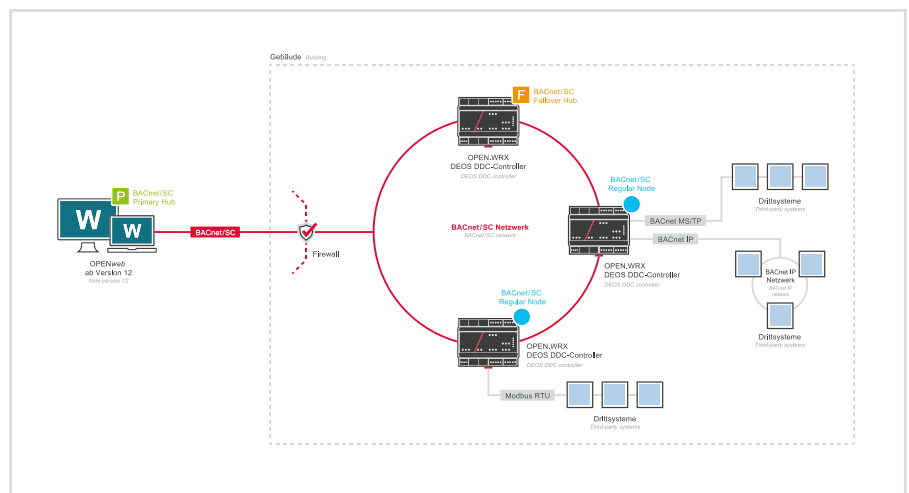
BACnet/SC networking topology at DEOS AG.

New to the BACnet International Community

Member of

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 Corporate membership includes a who's who list of top tier companies and industry professionals involved in the design, manufacture, 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.

Upgrade from Silver to Gold:

Powering Business Worldwide

Eaton Corporation

Eaton is an intelligent power management company dedicated to improving the quality of life and protecting the environment for people everywhere. We are guided by our commitment to do business right, to operate sustainably and to help our customers manage power – today and well into the future. By capitalizing on the global growth trends of electrification and digitalization, we're accelerating the planet's transition to renewable energy and helping to solve the world's most urgent power management challenges.

30 Pembroke Road
Dublin 4, Ireland
D04 Y0C2
eaton.com

New Corporate Affiliate Member

Lumen Radio AB

LumenRadio, a technology company headquartered in Gothenburg, Sweden, was founded in 2008 with a primary focus on entertainment lighting. Their pivotal moment arrived when they effectively replaced all lighting control cables at the Coachella music festival, demonstrating their proficiency in wireless communication technology. Expanding on this achievement, they broadened their scope to encompass industrial applications and building automation, to deliver a seamless wireless experience to a diverse array of customers. Presently, they persist in their commitment to innovation and refining their frequency-friendly wireless technology to provide the most dependable solutions for OEMs, installers, and specifiers.

Johan Willins gata 6
416 64 Gothenburg
Sweden
lumenradio.com

New Silver Members:

CODRA

Codra is a company specializing in collecting and processing large amounts of data to help customers make better decisions. Codra offers two main services: developing the Panorama Suite Platform and providing engineering services. Their mission is to help customers optimize their facilities and lead with the core values of ambition, commitment, and sustainability.

Immeuble Hélios
2 Rue Christophe Colomb, 91300 Massy
France
codra.net

Q-PAC

From 2012 onwards, Q-PAC recognized the requirement for ECM technology in the specialized Commercial HVAC sector. At their essence, they identify as a technology-driven company that spearheads advancements in the fan system industry through their innovative solutions. Their objective is to meet client needs by blending experienced professionals with fresh perspectives, conducting thorough research, and creating innovative designs. They are committed to delivering high-quality fan systems for existing and future air handling units.

4010 Deerpark Blvd
Elkton, FL 32033
United States
q-pac.com

New Platinum Members

Amerlux

Amerlux, a wholly-owned subsidiary of Delta Electronics, has been a catalyst for transformation in the lighting industry since 1984 through proactive engagement with the market. Amerlux firmly believes that lighting encompasses more than just visibility; it also plays a crucial role in setting the right atmosphere. Their solutions provide five essential components: vivid color, improved comfort, total control, simple customization, and enhanced security. There is a vast selection of lighting options to choose from, resulting in significant savings. Their range includes both indoor and outdoor lighting solutions that are known for their fashionable design, energy-saving features, and advanced technology.

178 Bauer Drive
Oakland, NJ 07436
United States
amerlux.com

Vivotek

Vivotek Inc. was founded in February 2000 and has established itself as a key player in the international security surveillance sector. The company is focused on building a global IP surveillance ecosystem and fostering enduring partnerships to promote a safe and secure society. VIVOTEK offers a diverse range of IP surveillance solutions, such as network cameras, PoE switches, network video recorders, and video management software. VIVOTEK has expanded its international presence through investments in research and development. By valuing customer feedback and fostering partnerships, VIVOTEK aims to establish a strong industrial ecosystem. Its solutions not only enhance global public safety but also emphasize environmental sustainability. Committed to enhancing

6F, No.192,
Lien-Cheng Rd., Chung-Ho,
New Taipei City 23553,
Taiwan
vivotek.com

BACnet International Board of Directors

Andy McMillan
President & Managing Director

Paul L. Bartunek, III
Mechanical Sales (Chair)

James Burke
Johnson Controls (Vice-Chair)

Salvatore Cataldi
Belimo

Brad Hill
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QA Café

Todd Lash
Siemens

Raymond Rae
CopperTree Analytics

Dennis Swoboda
Blue Ridge Technologies

Michael R. Wilson
Nlyte Software

Expand your BACnet Knowledge

THE BACnet INSTITUTE

Courses • Resources • Community

ACCREDITED IACET PROVIDER

The BACnet Institute (TBI) continues to grow. There are now over 6,000 registered users, and articles and presentations are continually being added to the Resources section, providing many materials to help you and your colleagues stay connected and engaged. A better-informed community brings positive change, so take a moment to expand your knowledge of BACnet as well as encourage others!

Popular BACnet International Trade Show Session Recordings

BACnet International is proud to present a slate of education sessions at the AHR Expo. Recordings of the sessions are uploaded on TBI for viewers to rewatch or view if they could not make the session in person, including the seven presented at the 2024 AHR Expo in Chicago. Those sessions include:

- BACnet 101: An Introduction to BACnet, presented by Edward Tom, Yaskawa America
- Compliance as a Catalyst: Regulatory-Driven Sustainability in Data Centers, presented by Michael Wilson, Nlyte Software and Enzo Greco, Nlyte Software
- BACnet Global Community Outlook (2024-2029), presented by Andy McMillan, BACnet International, Hans Symanczik, BACnet Interest Group Europe, Jeremy Towler, BSRIA, Michael Osborne, SSPC 135 Committee, and Sakhee Chandrayan, INBAC Association
- Securing the Smart Building with BACnet/ SC, presented by Dave Robin, BSC Softworks and Nate Benes, University of Nebraska – Lincoln
- BACnet International Guide Specification for Lighting System Integration into the Facility BAS, presented by Grant Wichenko, Appin Associates
- BACnet in the Cloud, presented by Ken Gilbert, Automated Logic

- Web Services. What they are and why they matter., presented virtually by Coleman Brumley, Passive Logic and SSPC 135 Committee Chair

Multi-Level and Multi-Lingual Materials in Resources

With over 200 articles and presentations focused primarily on BACnet, the TBI library offers a variety of topics, in different languages and expert levels. Among the top articles accessed are "An Introduction to BACnet," "Deploying and Maintaining BACnet Systems in Today's Networks," "LED Lighting – An Automation Armageddon," "Cybersecurity for BACnet BAS Webinar," and many more. Also check out the bi-lingual "Device Profile Families Facilitate Planning" article by Bernhard Isler. Check back often, since articles continue to be added.

Interactive Courses Fit into Your Schedule, and Offer FREE CEUs & PDHs!

There are three interactive courses available on TBI, and, as an IACET Accredited Provider, BACnet International offers FREE Continuing Education Units (CEUs) upon completion of each course. Professional Development Hours (PDHs) are also available upon completion. The three courses are:

- BACnet Basics - a comprehensive course that covers all the basics of BACnet. Don't know anything about BACnet or need a refresher? This is an excellent course to take.
- The Facility Manager's Guide to Building Automation Systems. You don't need to be a facility manager to take this course, in fact, this course is incredibly beneficial to anyone who works in the building automation industry.

- BACnet Device Profiles - introduces learners to the various BACnet device profiles and explains the role of each in the building automation. It also shows the learner how various profiles can be combined in a single device and explains the rules behind the combinations.

A Community Forum to Get Your BACnet Questions Answered

The BACnet Community Forum is an interactive environment that offers knowledge-sharing and provides an opportunity for users to submit BACnet-related questions to be answered by a panel of experts in the BACnet industry.

Participants in the forum can submit new discussions, reply to discussions, and receive updates of peer posts through email subscriptions. Answers to submitted questions are posted in the forum, which can then be searched by all registered users.

Past discussions submitted through the Cornell University BACnet-L email list server are also included.

Visit TBI!

TBI is a central and global source for BACnet knowledge and education. To access the wide array of resources and information, visit thebacnetinstitute.org to sign up or log in.

Sign-up for a FREE TBI account

BACnet Testing Laboratories (BTL) Testing Updates

BTL Testing and BTL Test Package Information

A BTL Certification indicates that the BACnet Stack of the product has successfully passed rigorous industry standard testing and demonstrates that the device correctly implements all of the BACnet functionality it contains as governed by ASHRAE standard 135. The BTL Listing, the BTL Certificate of Conformance, and the right to use the BTL Mark are the three elements that indicate a product has passed the testing and achieved BTL Certification.

The BTL Working Group defines the BTL Test Plan and governs the testing. The BTL Test Package and BTL Testing Policies are published on the BTL website: btl.org/testing-documentation.

New BTL Test Package 23.3

BTL Test Package 23.3 was published February 14, 2024. This test package includes testing up through Protocol Revision 23 of the BACnet standard (ANSI/ASHRAE 135-2020 plus addenda: cd) – the same as the previous version, BTL Test Package 23.1 In this new version of the test package, the BTL Test Plan changes references to the ASHRAE BACnet Testing Standard 135.1 from the previous version 135.1-2019 to 135.1-2023. It reduces the size of the BTL Specified Tests document from 663 pages to 49 pages, removing all tests that are now part of 135.1-2023.

The changes in the new ASHRAE 135.1-2023 and the new BTL Test Package 23.3 are the normal progression and enhancement of these two organizations collaborating to improve the documentation and testing process for BACnet develop organizations and Recognized BACnet Testing Organizations.

Test Package Transition Period Following Publication of Test Package 23.3

The BTL Working Group has established a transition period for BTL Test Package 23.3, so that testers can update tools used in BTL Testing. During the transition period, vendors with products claiming Protocol_Revision 23 or less may test with either Test Package 23.1 or with BTL Test Package 23.3. Products claiming Protocol_Revision 24 or greater must test with BTL Test Package 23.3. The transition period will end March 31, 2024. After that date, all products entering BTL Testing must be tested with Test Package 23.3.

Scan for BTL Test Documentation

ABOUT THE AUTHOR

Emily Hayes began work with BACnet International in 2014 as BTL-Coordinator, coordinating BTL Testing at the BTL Lab. In 2017, Emily took over leadership of the BTL Working Group as chair. Additionally, she led the transition from the BTL Listing Program to the BTL Certification Program. She became BTL Manager in January 2019. Emily maintains professional membership in the Project Management Institute (PMI), North Carolina Chapter of PMI (NCPMI), and Institute of Electrical and Electronics Engineers IEEE. Emily has a BEE from Auburn University and an MSEE from Duke University. She has maintained a Project Management Professional (PMP) Certification since 2010.

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Emily Hayes
BTL Manager, Certifications and Listings Manager and BTL Working Group Chair | BACnet International
btl-manager@bacnetinternational.org | www.bacnetinternational.org

New BTL-Listed Products, October 2023 – February 2024

Manufacturer	Product Name	Model
AAON	VCCX2 Controller VCCX2-FLO Controller VCCX2-GH Controller	ASM01698 ASM02702 ASM06716
AAON	VCCX2 Controller LF Chiller Controller DX Chiller Controller AZ3 Main Controller AZ3 VAV/Zone BACnet P.D. Controller AZ3 VAV/Zone BACnet P.I. Controller VAV/Zone BACnet P.D. Controller VAV/Zone BACnet P.I. Controller VCCX2-CES Controller Main DX Barrel Chiller Controller	ASM01698 ASM02437 ASM02317 ASM02450 ASM02424 ASM02425 ASM02426 ASM02427 ASM02702 ASM02655
AAON	VCCX-IP, VCCX-IPA, VCCX-IP FLO	ASM07424 ASM07503 ASM07657
ABB	FLXeon	CBXi-8R8, CBXi-8R8(-H), FBXi-X256, FBXi-8R8-X96, FBXi-8R8-H-X96, FBXi-X48, FBVi-2U4-4T-IMP, FBVi-2U4-4T-SI, FBVi-2U4-4T-FA-IMP, FBVi-2U4-4T-FA-SI, FBTi-7T7-1U1R, FBTi-6T1-1U1R, FBXi-256
ABB	E-AIRON FCL	FCLB/A 2.1-E, FCL/A 1.1-E, FCL/A 2.1-E, FCL/A 2.1 LITE -E
Accutrol LLC	AVR Product Family	AVR6000, AVR4000
Armstrong Monitoring Corp.	AMC Utx-B Series Gas Sensor/Transmitter	AMC-UTx-B-SM-SM-R-0000 where SM are N, 91A01, 91B01, 98A01, VCA01, VCB01
Automated Logic Corporation	OptiFlex™ BACnet Building Controller	OFBBC-A
Control Solutions	Babel Buster BB3-3101	BB3-3101
Delta Electronics, Inc.	IoT/Smart Building Controller	DFM-M800, DFM-M602, DFM-M440
Dwyer Instruments, Inc.	Series RHPX Humidity/ Temperature Transmitter	RHPX-x1x2x3C0-x4-OPT where x1 is 2 or 3 x2 is S or L x3 is B, D, E, F, G, H, R, S or W x4 is 00, 04, 08, 12 or 16 OPT is LCD, NIST or NULL

Manufacturer	Product Name	Model
Fr. Sauter AG	modulo 6 BACnet Router and SC-Hub	EY6RT30F001
Honeywell International	BACnet MSTP and IP VAV controller	WEB-VA75I24NM, WEB-VA75IB24NM, WEB-VA00IB24NM, CPO-VA75I24NM, CPO-VA75IB24NM, CPO-VA00IB24NM, CLMEVA75I24NM, CLMEVA00IB24NM, CLMEVA75IB24NM, VAA-VA75I24NM, VAA-VA75IB24NM, VAA-VA00IB24NM WEB-VA75M24NM, WEB-VA75MB24NM, WEB-VA00MB24NM, CPO-VA75M24NM, CPO-VA75MB24NM, CPO-VA00MB24NM, CLMEVA75M24NM, CLMEVA00MB24NM, CLMEVA75MB24NM, VAA-VA75M24NM, VAA-VA75MB24NM, VAA-VA00MB24NM
Honeywell International	Niagara Advanced Controller	N-ADV-112-H, N-ADV-112-H-C, N-ADV-112-H-D, N-ADV-133-H, N-ADV-133-H-C, N-ADV-133-H-D, N-ADV-133-H-B, N-ADV-133-H-B-C, N-ADV-133-H-B-D, N-ADV-133-H-B-W, N-ADV-133-H-B-W-C, N-ADV-133-H-B-W-D, N-ADV-134-H, N-ADV-134-H-C, N-ADV-134-H-D
J2 Innovations, a Siemens Company	FIN Framework BACnet Operator Workstation	FIN-BACnet-OWS
Johnson Controls	Facility Explorer	FX80
Loxone Electronics	Miniserver	100335 – Miniserver, 100512 – Miniserver Compact, 100336 – Miniserver Go
Occitaline	OxBigData	OxBigData
OEMCtrl	OptiCORE LS-1628-A	OptiCORE LS-1628-A LS-1628-A
Schneider Electric	SpaceLogic Thermostat- TC900 Series	TC903-EF4LDPSA, TC903-3A4LXPXA, TC903-3A4PDPSA-24, TC903-3A4PDPSA, TC903-3A4LDPSA, TC907-EF4LDPSAB, TC907-3A4LXPXAB, TC907-3A4PDPSA-24B, TC907-3A4PDPSAB, TC907-3A4LDPSAB
Siemens	Desigo Optic	5.1.4.191
Siemens	Room thermostat BACnet/Modbus	RDF400BN, RDF440BN, RDF460BN

Manufacturer	Product Name	Model
Siemens	Desigo PXC3 and DXR2 Automation Stations	DXR2.E18-101A, DXR2.E18-102A, DXR2.E18-101B, DXR2.M18-101A, DXR2.M18-102A, DXR2.M18-101B, DXR2.M11-101A, DXR2.M11-101B DXR2.E12P-102A, DXR2.E12PX-102A, DXR2.E12P-102B, DXR2.E12PX-102B, DXR2.M12P-102A, DXR2.M12PX-102A, DXR2.M12P-102B, DXR2.M12PX-102B, DXR2.E10-101A, DXR2.M10-101A, DXR2.E09-101A, DXR2.M09-101A, DXR2.E09T-101A, DXR2.M09T-101A, DXR2.E17C, DXR2.E17CX, DXP2.E18-110BR, DXP2.M18-110BR, PXC3.E16A-100A, PXC3.E72-100A, PXC3.E72A-100A, PXC3.E75-100A, PXC3.E75A-100A, PXC3.E16A-200A, PXC3.E72A-200A, PXC3.E75A-200A
Wago	Controller PFC200	750-8210, 750-8210/0040-0000, 750-8211, 750-8211/0040-0000, 750-8212, 750-8212/0000-0100, 750-8212/0025-0000, 750-8212/0025-0001, 750-8212/0025-0002, 750-8213, 750-8215, 750-8216, 750-8217
Xylem	HYDROVAR	HVLx,1.x2-A0010 where x1 is 2, 3, 4 x2 is 015, 022, 030, 040, 055, 075, 110, 150, 185, 220
Zhejiang Mislan Technology Co	IoT/Smart Building Controller	MSL-DI8-IP, MSL-8044-IP

Calendar of BACnet International Events

2024	Event	Location
September 24 – 26	PlugFest Interoperability Workshop	Durham, NH
April 15	BTL Working Group Fort	Lauderdale, FL
June 20	BTL Working Group	Indianapolis, IN

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