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White Paper

The BACnet® Protocol Proves Its Popularity

BACnet is the Heating, Ventilation and Air Conditioning (HVAC) industry standard protocol, according to its founding organizations, American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) and American National Standards Institute (ANSI). Its reputation and growing popularity continue to make it a logical choice for a standard protocol across a system, or to use as an interoperability tool to help knit together a cohesive, tightly integrated system despite disparate technologies or vendor systems. BACnet continues to be supported by the major building automation system (BAS) providers (after all, they were the ones to support its creation), as well as those suppliers who value interoperability with such systems as lighting controls, HVAC mechanical equipment, security and access control systems, fire and life safety systems, and many more.

BACnet—Born to be Great

BACnet was born and continues to be cared for by the SSPC-135 BACnet committee within ASHRAE. Siemens Building Technologies remains actively involved in the committee—a role it has played since 1995 when the first standard was published—further refining the BACnet standard and improving it so it can meet emerging needs and user requirements.

Because ASHRAE is easily the most important organizing body for suppliers and customers within the building and facility systems industry, consensus is that BACnet is in the right hands. It is widely believed by industry experts that BACnet, due to the truly open, standard and industry genesis of the protocol, is the best standard protocol to leverage in system-level controllers and workstations within a BAS.

An important attribute of BACnet is that it was designed specifically for HVAC control and BAS. This is an important distinction because the other popular protocol for BAS and

HVAC control – LonTalk® - was not designed for complex system-level controllers, nor was it designed specifically to meet the needs of the HVAC / BAS industry.

Its industry and technological pedigree aside, the BACnet standard has also shown extensibility to other building system controls outside of HVAC, including lighting control, fire/life safety, and access/security systems.

All for One (Protocol)

To ensure any protocol's ongoing viability, its proponents need to support its adaptation and accreditation. To address these and other important, related issues of industry cooperation, marketing and interoperability testing, the BACnet Manufacturers Association (BMA) and the BACnet Testing Laboratory (BTL) were launched in 2000.

A founding member of both organizations, Siemens Building Technologies continues to be an agent for development within the BACnet community. For example, Siemens Building Technologies helped create BACnet International—a new organization formed by combining the former BACnet Manufacturers Association (BMA) and BACnet Interest Group North America (BIG-NA), and is now helping to refine the BACnet International mission and charter. Through its ongoing BTL committee participation, Siemens Building Technologies supports BACnet development, including interoperability testing and Plugfest opportunities.

To help foster "openness" and preserve its value to all users, BACnet International and BTL will continue to promote and enable interoperability testing, educational programs, and promotional activities. Because the organization's members are those companies involved in the design, manufacturing, installation, commissioning, and maintenance of control equipment using BACnet as a protocol for communication, they have a vested interest in making sure the protocol is a standard that assures interoperability—a critical user imperative.

No surprise then that the Siemens Building Technologies BAS solution is built upon the functionality of the BACnet IP protocol, and incorporates the BACnet protocol throughout its building automation and workstation network architecture to provide a truly powerful BACnet-based system that brings together standard protocol interoperability with features and functions such as remote paging, reporting and archiving, and web-based

functionality. Aligning with BACnet's inherent strengths, Siemens Building Technologies leverages the protocol to help solve its customers' most complex control and system design problems, which includes integrating across systems developed on proprietary platforms and protocols.

A User's Guide to Incorporating BACnet

Involved in a project with controls and systems using the BACnet protocol? The following checklist outlines the preliminary assessment procedures, key specification deliverables, BACnet expertise and tools needed, as well as best practices for commissioning and problem resolution to help bring a project to a successful conclusion. First a bit of preamble: All of these steps should be considered critical to form the basis for the project plan. All parties should be in agreement that the plan is clear and execution is attainable.

1. Overall, the owner must fully understand the goals of the project and how these goals fit the facility master plan.
    a. Ensure that relevant departments within the owner's organization, most likely purchasing and facility operations, communicate their needs for the project.
    b. Realize that the goals and objectives for purchasing personnel are typically cost and sourcing-related, while the goals and objectives for facility operations are typically related to operating efficiency, ease of maintenance, and trouble-free operation.
2. Project assessment is the next step.
    a. Make certain all parties, including vendors and project managers, understand the owner's functional, performance, and interoperability requirements.
    b. Assess the BACnet capabilities of the proposed vendor(s) BACnet implementations to align the capabilities with the project expectations and requirements.
    c. Use the PICS (Protocol Implementation and Conformance Statement) and BIBBs (BACnet Interoperability Building Blocks) from vendors involved to identify the functional capabilities of their BACnet implementations and identify the datalink types supported in the system architecture. Visit

www.bacnet.org and www.bacnetassociation.org for more information about PICS and BIBBs.

d. Assess the information available from each system based on the PICS and BIBBs, and create a list of objects to be shared, including object IDs, object names, and object descriptions.

e. Determine what, if any, hardware and software is required for each system to communicate using BACnet. If BACnet datalink layers are not compatible, a router or bridge will be required.

f. Create an action plan to acquire, set-up, and configure the necessary hardware and software to meet the requirements.

g. Involve the Information Technology group within the owner's organization to provide network expertise when employing BACnet over the corporate network infrastructure

h. Determine if upgrades are required to existing equipment, software, or networking infrastructure, and identify an action plan to accomplish the required upgrades.

3. Specify the project deliverables to ensure success.
    a. Document the owner's requirements in a specification used for procurement.
    b. Clearly specify vendor software, and control hardware needed to provide the integration based on the project assessment results.
    c. Thoroughly communicate vendor responsibilities for integration implementation and commissioning.
    d. Specify tools, procedures, and responsibilities for troubleshooting, including the use of BACnet protocol analysis tools that provide answers during troubleshooting activities.
    e. Focus on the goal of integration application and system functionality, day-to-day operation requirements, and value added features that will ensure reliable and efficient facility operation.

4. Next, organize the expertise and tools necessary to implement and support a successful BACnet integration project.

a. Coordinate the communications between the vendors involved so that preliminary work such as solution testing and configuration are organized and executed. This may include research into previous BACnet Testing Laboratory (BTL) activities and testing if project vendors participate in the BTL.
b. Make certain to have vendor representatives who have expertise on the systems and BACnet solutions at the site during implementation.
c. Have BACnet protocol analysis software, and the expertise to interpret the results, available on-site for instant BACnet troubleshooting and network diagnostics.

5. When commissioning and, if necessary, troubleshooting, the project manager or systems integrator should be prepared to handle many details and to work effectively with the different vendors.
    a. Ensure that all vendors involved in the integration are also actively involved in commissioning and system checkout to handle any emerging integration issues.
    b. Compare the original requirements with the documented performance, functionality, and interoperability requirements to determine if there are any requirements that have not been implemented or have been implemented incorrectly.
    c. If troubleshooting is needed, apply BACnet protocol analysis software to identify sources of integration problems at the communication protocol level. Accurate and complete protocol-level information removes speculation on communication problems, which can prevent unnecessary and unproductive finger pointing among vendors.

It should be clear by now that BACnet offers vendors significant flexibility in support of their products and services. This flexibility also mandates careful planning and project management when using the BACnet protocol for integrating multiple vendor systems. Therefore, implementing BACnet requires attention to details and diligent project management.

Assigning an integration project manager and doing your homework ahead of time will help you plan and execute a successful integration project. Perhaps the most critical component of the “homework” phase is to discern and document current and future system requirements for functionality, performance, and interoperability. These specifications will be used for design, installation, commissioning, and operations and maintenance. Resources exist at the *www.bacnet.org* website to help you articulate your requirements in a manner familiar to BACnet vendors (PICS and BIBBs), making communication on the integration project most effective.

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