

Expanding BACnet's Horizons

Five years after the first public demonstration of BACnet products, the technology is still growing and expanding.

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The International Air Conditioning, Heating, Refrigerating Exposition that accompanied the 2001 ASHRAE Winter meeting in Atlanta included the largest interoperability demonstration of BACnet¹ products ever held and also marked the five-year anniversary of the first public unveiling of interoperable BACnet products, which took place at the same venue. In 1996, 13 companies demonstrated a variety of prototype products. This time, 84 products from 36 companies from North America, Europe, and Asia were interconnected in a network that spanned the show floor. The passing of this milestone provides an opportu-



nity to take a look at current BACnet technology and where it is heading.

Today there are 77 registered BACnet vendor identifiers. Most of these companies are in North America but there are also companies from Europe, Asia, and other parts of the world. BACnet requires every device to have a ven-

dor identifier. The vendor identifier is part of the mechanism used to extend the capabilities of the standard. By linking extensions to a particular vendor it becomes possible for other devices to know how to interpret and use them.

The BACnet Manufacturers Association (BMA) conducted a survey of its 15 corporate members in an attempt to determine

how many BACnet products are in use. The BMA's 2000 Annual Report² indicates that only six companies responded to the survey. Table 1 shows the results.

What do these survey results indicate? First, the openness of BACnet technology. There is no way to track the use of BACnet except from information

TABLE 1. BACnet Deployment Statistics

Item	Number
Installations	19,054
Gateways	2,410
Devices by Network Type	
Ethernet	11,920
ARCNET	95,567
Master-slave/Token-passing	248,500
Point-to-point	1,549
Workstations	15,807
Large controllers	53,391
Unitary Controllers	299,600

vided voluntarily by manufacturers. From this small response, it is hard to tell with any certainty just how many BACnet products there are in the field. If we assume those companies with the most to gain responded, then these numbers provide at least a ballpark estimate of the current state. Unitary controllers outnumber gateways by over 100 to 1. This clearly indicates that BACnet is being used at all levels in building control systems and is not suited primarily to high level integration of systems, as some have suggested.

Figure 1 shows where BACnet installations can be found. The BMA survey indicates that BACnet systems are installed in 82 countries and the international territory of Antarctica. BACnet has been translated into Korean, Japanese, and Chinese. It has been adopted as a pre-standard by the European Community, as a national standard in Korea, and, in modified form, as a national standard in Japan. It is also a proposed world standard being deliberated by the International Organization for Standardization (ISO). The picture that emerges here is a worldwide interest in BACnet and a world market for BACnet products,

BACnet ENHANCEMENTS

BACnet was designed to be expandable and is maintained under the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE's) "continuous maintenance" rules. This means there is a standing standard project committee (SSPC 135) with the task of interpreting the standard and responding to proposals for additions or enhancements to it. Proposed additions can come from anywhere and may be made at any time. So far, most proposals have originated from manufacturers.

Since publication of the BACnet standard in 1995, two addenda have been approved.^{3, 4} Addendum *a*, published in 1999, is popularly known as BACnet/II? Its contribution to BACnet was to provide a new and more powerful way to use Internet Protocol (IP) technology in BACnet systems. Addendum *b*, published in 2000, contains 17 "independent substantive changes" that include new Multi-state Value, Trend Log, and Averaging object types and two new services, ReadRange and UTCTimeSynchronization. Addendum *b* also refines and enhances several other BACnet features pertinent to alarm processing and scheduling.

Three other addenda (*c*, *d*, and *e*) are currently in various stages of public review. Collectively they will:

- Add functions specifically to address the needs of fire and life safety systems.
- Define new tools for specifying BACnet systems.
- Define standard backup and restore features.
- Outline a way for making extensions made to the standard (by vendors or other organizations) visible and potentially useable by others.

When these addenda are adopted, a new consolidated version of the standard will be published that includes all of the changes.

BEYOND HVAC CONTROLS

The BACnet standard is expanding beyond HVAC controls. At the ASHRAE Winter Meeting in Atlanta, Addendum *c*, which contains features designed for life safety systems, was approved for a second public review. This addendum was developed in cooperation with the National Electrical Manufacturers Association (NEMA) and the National Fire Protection Association (NFPA).

SSPC 135 has also created a new working group for lighting control applications. Several companies already have BACnet lighting control systems on the market. Their experience has generated some ideas for new BACnet features that would make integration of lighting control systems easier. The intention is to work with the NEMA Lighting Controls Council and the Illuminating Engineering Society of North America (IESNA) to develop appropriate BACnet additions that address lighting control needs.

In response to a recently completed ASHRAE research project, RP- 10 11 Utility/Energy

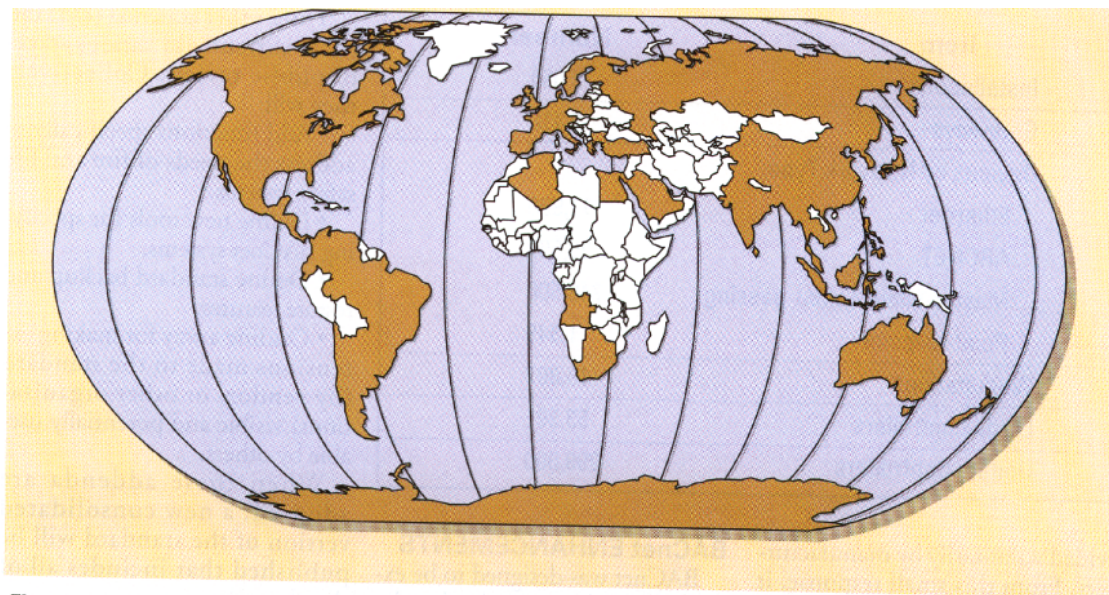


Figure 1. BACnet installations around the world. The shaded areas depict countries and territories where BACnet systems are known to be installed.

Management and Control System Communication Protocol Requirements, a working group to develop BACnet enhancements for these applications has also been formed. This effort will address applications such as metering, load management, and real-time price negotiation.

TESTING AND CERTIFICATION

Public review of proposed ASHRAE Standard 135.1P, Method of Test for Conformance to BACnet, closed on January 30, 2001. Standard 135.1 will be the technical basis for BACnet listing and certification programs in Europe and the U.S. The process of addressing public review comments has begun and will take at least several months.

Testing and listing organizations in the U.S. and Europe have already begun to identify independent testing laboratories and develop procedures. Testing will begin soon using the draft version of the testing standard.

The BMA and the BACnet Interest Group-Europe (BIG-EU) have announced their intention to sign a memorandum of understanding defining common testing tools, submission procedures, test procedures, and product listing policies. Testing will begin simultaneously in Europe and the U.S.

BMA and BIG-EU will use a common mark as the international symbol for identifying listed products in Europe and North America. To be awarded a mark, products will be subjected to rigorous tests performed at a recognized test laboratory. The common testing framework will provide assurance to building owners that listed products are compliant with the BACnet standard and will interoperate in specifically endorsed ways. Testing will improve the quality and uniformity of BACnet systems. Manufacturers who test their products at one approved facility will have that acceptance recognized worldwide.

Five years after its adoption,

the BACnet standard is finally beginning to emerge as a significant market force for HVAC and other building control applications around the world.

REFERENCES

- 1) BACnet is a registered trademark of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers Inc. (ASHRAE). Use of trademark name does not imply recommendation of any commercial products by the National Institute of Standards and Technology.
- 2) BMA 2000 Annual Report. Page 9. BACnet Manufacturers Association, 55 Temple Place, Boston, MA.
- 3) ANSI/ASHRAE Standard 135-1995, Addendum a. American Society of Heating, Refrigerating, and Air-Conditioning Engineers Inc. Atlanta, GA.
- 4) ANSI/ASHRAE Standard 135-1995, Addendum 1999. American Society of Heating, Refrigerating, and Air-Conditioning Engineers Inc. Atlanta, GA.