

For too long, building owners and engineers have been pulled in two directions when it comes to choosing which building communications protocol to use in their spec due to confusion about which standard is truly open and which one isn't. Fret no longer: In the battle to be the industry's undisputed king of open building communications protocols, BACnet is the clear winner while LonTalk is fast losing support because of its one-branch family tree.

Who's who on the battlefield

The more informed industry pundits don't necessarily consider BACnet and Lon as completely at odds with each other; in fact, many feel that BACnet and Lon complement each other. But you have to pick sides, right? In the BACnet-Lon hostilities, the shot heard 'round the world was the one defining Lon as an open protocol. And so the revolution began.

On one side of the battlefield is the LonTalk protocol developed by Echelon Corp. LonTalk is embedded on the Neuron® chip, which was designed by Echelon and is manufactured by Cypress Semiconductor and Toshiba. Any LonTalk-based device is a LonWorks device. All LonWorks devices use the Neuron chip, which Echelon owns.

On the other side is the BACnet standard protocol, conceived, developed and maintained by a consortium of industry stakeholders in partnership with the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). BACnet is also approved by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO).

Both protocols have testing and listing organizations that define design requirements and tests for verifying manufacturers' claims of conformance to their respective protocol. The LonMark Interoperability Association and the BACnet Manufacturers Association (BMA) are made up of manufacturers, end-users, equipment specifiers and other industry stakeholders. Indeed, some have membership in both associations.

Defining "open"

By its most general definition, an open protocol is the property of the public domain, belonging to no single entity and freely available to anyone who wants to develop for it.

This definition is the line in the sand—drawn by any industry stakeholder on either side of the battle—that determines who should be called open and who should be called proprietary.

For any LonWorks system to work, the Neuron chip must reside inside each controller. While LonTalk was developed specifically to enable devices to interoperate, Echelon's ownership of the Neuron chip makes LonTalk a proprietary protocol. Echelon licenses the Neuron chip along with its LonWorks software, design tools and software development kit and reaps the benefits of having royalties grow with an increase in the number of seats in use. In addition, for a "nominal fee," Echelon licenses the implementation design of the Neuron chip to Toshiba and Cypress Semiconductor.

Where LonTalk is designed, marketed and controlled by Echelon Corp., BACnet is non-proprietary. That means a BACnet system requires no proprietary chip sets or protocols. No single company owns BACnet. It is developed by consensus and it is industry stakeholders who determine the path of BACnet's development.

Lon device manufacturers have to pay to play. Anyone wanting to develop a Lon device must first license the chip from Echelon. BACnet developers simply obtain the specification and sit down at the drawing board.

The five largest controls companies in the industry and the biggest promoters of LonWorks, all now offer—or have announced plans to offer—BACnet systems.

How BACnet won the war

The outcome of most wars is determined by a few key battles. In the war of open protocols for building controls, BACnet's decisive victory is defined by three: Industry-wide acceptance, greater benefits than LonWorks and a change in manufacturers' ideology about their building protocols offerings.

Industry-wide acceptance

High-technology and industrial market analyst firm Frost and Sullivan predicted in its 2002 report, "North American Building Automation Protocol Analysis," that BACnet-related products would grow at a 20% annual rate, with nearly 750,000 units sold by 2008. Frost and Sullivan identified three primary reasons for BACnet's rapid growth:

- Deployment of BACnet-only systems by a growing number of companies
- Ongoing collaboration to enhance the protocol

- BACnet's inherent ability to incorporate increasingly sophisticated capabilities

According to a recent survey conducted by the BMA—whose objectives include BACnet education, and interoperability and compliance testing—more than 82 countries and associated territories host BACnet systems. The number of registered BACnet-vendor identifiers grew from 113 to 140 during 2004 and now includes companies in 16 countries.¹ In 2001, BACnet sales totaled 183,000 units to LonWorks' 58,000.² At the writing of this article, engineers are specifying BACnet over Lon at a rate of roughly 2.5:1.³

Even before its 1995 debut, the BACnet communications protocol underwent three public reviews and resolved more than 741 comments made by its stakeholders and developers. Currently, BACnet is on its third revision—ANSI/ASHRAE Standard 135-2004—incorporating both solicited and unsolicited ideas from all sectors of the industry. At last count, the BMA is composed of 24 member companies that lead the building controls industry. The BMA works with several existing organizations, including:

- The ASHRAE BACnet Committee (Standing Standard Project Committee (SSPC) 135)
- Comité Européen de Normalisation (the European Committee for Standardization) Technical Committee 247 (CEN/TC247)
- Institute of Electrical Installation Engineers of Japan (IEIEJ)
- The BACnet Interoperability Testing Consortium
- BACnet Interest Group—Australasia (BIG-AA)
- BACnet Interest Group—Europe (BIG-EU)
- BACnet Interest Group—North America (BIG-NA)
- National Electrical Manufacturers Association (NEMA)
- National Fire Protection Association (NFPA)
- International Organization for Standardization, Technical Committee 205 (ISO/TC205)

Greater benefits

LonWorks functions best on the device level and requires gateways for effective operation at the integration and management levels. But you can apply BACnet's benefits on every level of the BAS: from sophisticated operator workstations to field-level devices, such as controllers. Where Lon creates "islands of interoperability" within a system, BACnet accommodates a variety of system architectures and links them from top to bottom. In a recent reader survey

conducted by *Building Operating Management*, the top three benefits of an open protocol system were ease of integration, flexibility on vendors for upgrades and lower cost of upgrades.⁴

Integration

With built-in native support for Ethernet networks and the Internet Protocol (IP), BACnet devices are ready to be deployed on nearly any enterprise network. BACnet facilitates the integration of other building controls into the HVAC system. BACnet was designed with the inherent ability to perform non-HVAC communications. In fact, many manufacturers of lighting, security, access and fire/life safety products build in BACnet functionality to further simplify their products' integration into a BACnet-based controls system.

Flexibility

If a vendor comes up with new functionality for which BACnet communication is required, he can add new properties or create new object types that are accessed in exactly the same way as the original object types defined in the standard. Stakeholders not only expect BACnet evolution—they encourage it.

With the ever increasing number of BACnet vendors, there is more choice than ever for building automation solutions based on open protocols. Whether a project is under new construction, undergoing a retrofit or opening up a proprietary system by dual-sourcing with BACnet, building owners can have a high-performance, open protocol building that is still cost effective on the bottom line. For example, when the City of Seattle evaluated its building controls expenses, it discovered that it could save as much as 20% on its overall HVAC expenditures by dual-sourcing with a BACnet vendor.

Cost savings

LonWorks' limited number of suppliers doesn't spark much price competition. When Echelon is the primary supplier of LonWorks components, there is even less motivation to give the consumer a break. And don't forget the additional premiums for modules needed to implement a LonWorks network. Without a truly open protocol like BACnet, building owners are locked into a single vendor's solution and are subject to his pricing conventions. Custom programming is often well beyond the budget, yet swapping out all existing controls for an open protocol system can be cost prohibitive.

The lack of interoperability makes it impossible to take a facility-wide approach to cost-saving strategies like electrical demand limiting and heating and cooling optimization.

With open protocols, building owners have exponentially more choices in how efficiently their building operates—not just today but in the future because open protocols are built for scalability. An open protocol doesn't just improve the performance of the controls system, it increases the potential of an entire building.

A change in ideology: further proof

In the last year, a large number of manufacturers debuted BACnet additions to their portfolios:

- January 2004: Andover announces that their Video Monitor software package has been enhanced to include BACnet functionality. In April 2003, the company announced a new product line of native BACnet controllers and front-end workstation software.
- February 2004: Gridlogix launches an XML Web Services-based BACnet server.
- June 2004: Siemens bases its Total Building Solutions product portfolio on BACnet.
- October 2004: York introduces its ISN ConneXsys control line, which provides complete BACnet connectivity from terminal units to chillers.

Honeywell, Siemens, Invensys, Johnson Controls (JCI) and TAC, the five largest controls companies in the industry and the biggest promoters of LonWorks, all now offer—or have announced plans to offer—BACnet systems. And while BACnet companies are achieving substantial growth, Echelon stock has plunged from \$98 in 2001 to under \$7 in 2005.

The aftermath of war

The aftermath of war is typically a time to rebuild and reassess alliances. Now that you know BACnet is the only truly open communications protocol and the future of building controls, you can spec it with confidence. A spec-building website such as OpenSPECS (<http://specify.bacnet.com>) can help you build a spec that includes some BACnet components to open up an existing proprietary system or, for an entirely open one, a fully BACnet-compliant spec.

- 2 "North American Building Automation Protocol Analysis," Frost & Sullivan, 2002.
- 3 <http://reedconnect.com>, Plan Service, sample taken February 23, 2005 using keywords "BACnet" and "LonWorks."
- 4 "Proprietary or Open? Real Question is, 'What's in it for Me?'" *Building Operating Management*, October 2003.

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1 "BACnet Moves Forward," *Networked Controls*, a supplement of *HPAC Engineering*, October 2004.