

A Comparison of ASHRAE's BACnet and LONWORKS

	BACnet	LON
Organization responsible for the technology?	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) and, in the case of Protocol Implementation Conformance Statements, individual BACnet developers	LONWORKS is an open standard that has been adopted by several accredited standards organizations and independent organizations. While the technology was originally created by Echelon Corporation, the protocol, physical layer transport, and/or object definitions are also overseen by American National Standards Institute (ANSI 709 group), the Institute of Electrical and Electronics Engineers (1473-L group), and the independent LONMARK Interoperability Association.
Who was responsible for the technology's development?	ASHRAE and individual BACnet developers	Echelon Corporation, ANSI, IEEE, and the LONMARK Interoperability Association
Reason for development?	BACnet was developed by ASHRAE for the needs of ASHRAE members for heating, refrigeration, and air conditioning control	LONWORKS was developed to meet the needs of four distinct market groups: building automation, factory automation, transportation automation, and home/utility automation. Within building automation LONWORKS was specifically designed to be used for security, fire/life safety, access control, vertical and horizontal transportation, heating, ventilation, air conditioning, sub-metering, energy monitoring and conservation, air quality monitoring, weather monitoring, lighting, and sun blind control.
How is the technology maintained and/or enhanced?	A "Standing Standard Project Committee" (SSPC 135) has been formed with this task. Again, its membership is balanced and the process is entirely open - anyone with an interest may freely participate in the committee's work.	ANSI – standing committee must approve changes to the protocol (709.1) and physical layers (709.2,3,4) . Technical documentation on 709.x is under ANSI control and only available through Global engineering. LONMARK Interoperability Association – pertinent technical committee of this independent organization must approve changes to objects and network variables

What is the financial condition of the parent organizations?	ASHRAE is a not-for-profit organization but is financially sound.	ANSI and IEEE are accredited not-for-profit standards organizations. LONMARK Interoperability Association is profitable. Though not the "parent" organization, Echelon is a profitable public company (NASDAQ: ELON).
What does it cost to use the technology?	Anyone may develop products using BACnet without cost.	Anyone may develop products using LONWORKS without cost. A no-fee patent -use license is required in accordance with ANSI rules governing open technology.
What hardware is required to implement the technology?	BACnet must be ported by each user for each new processor. AHRAE provides no tools for this purpose	LONWORKS protocol is published by ANSI and may be incorporated directly into products in accordance with ANSI rules. Silicon implementations of the ANSI protocol are available from Cypress, Toshiba, Echelon, Adept, and LoyTec. Echelon offers programming tools for Cypress, Toshiba, and Echelon parts. Adept and LoyTec offer separate tools.
What network technologies are supported?	BACnet was originally designed to operate on Ethernet (10 or 100 Mbps), ARCNET (2.5 Mbps or 0.156Mbps), Master-Slave/Token-Passing (up to 0.0768Mbps), Point-to-Point (speed determined by serial line and/or modems). BACnet also supports native use of the Internet Protocol and its datalinks.	Ethernet (1Gbit) – Cisco System assisted with the development of the LONWORKS -over-IP channel Power mains (5kbps) Twisted Pair (1.25Mbps) Coaxial (1.25Mbps) Fiber optic (1.25Mbps) RF (1.25Mbps) Infrared (1.25Mbps)
What internet options are available?	BACnet LANs can be interconnected using "tunneling routers" (available from at least two sources) or native BACnet/IP devices may communicate directly.	Tunneling router Application router SOAP/XML Native LONWORKS/IP devices
Are the technologies "Plug 'n Play"?	BACnet devices are not currently "Plug 'n Play". All require configuration.	Yes – many users of LONWORKS sell Plug-and-Play products All LONWORKS products may also be configured
Can either technology be called a <i>de facto</i> standard?	No. <i>De facto</i> standards are nearly ubiquitous in their application areas. The Microsoft Windows operating systems are an example of a true <i>de facto</i> standard: it is almost impossible to find a PC that is not using these	Yes. There are thousands of OEM manufacturers building LONWORKS products worldwide, and in some cases, such as Finland, LONWORKS has been declared a national building standard.

	products. Such a universal presence is clearly not the case for BACnet at this time.	
What is the state of <i>de jure</i> standardization?	BACnet is an ANSI/ASHRAE standard, a Korean national standard, a CEN (European Community) "pre-standard", and an ISO (international) "committee draft".	BACnet - LonTalk (the protocol which defines LONWORKS) is one of the LANs within the BACnet standard ANSI 709.x IEEE 1473-L SEMI (Semiconductor Equipment Manufacturing) AAR (Association of American Railroads) CEN – TC247 prestandard

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