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Creating Security Solutions.
With Care.

The BACnet Protocol
in Security & Building Management
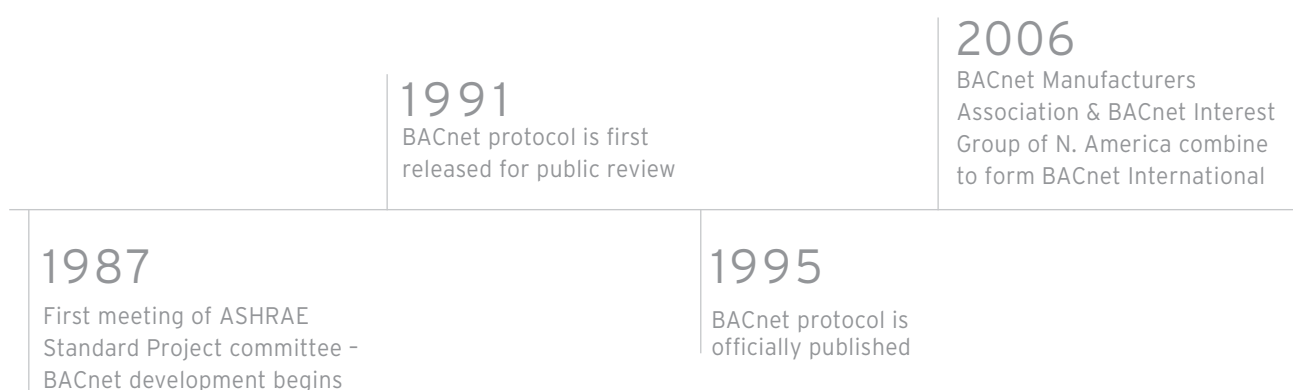

• WHITEPAPER •

Introduction

There is a growing trend towards integration between security and building management. The fact that most major vendors have by now chosen IP networking solutions presents an opportunity for such integration based on a common standard. There are several protocols available that allow different security and building systems to interoperate. Of these protocols the BACnet protocol provides the most complete and effective level of integration.

History of BACnet

The BACnet protocol was developed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Its development began in Tennessee, U.S. in 1987 at the first meeting of the ASHRAE Standard Project Committee. The committee faced the task of defining a communication protocol for building control and energy management, in order to standardize the method of communications between building automation devices from different manufacturers.

The goal of the first meeting was to produce a list of characteristics of a good protocol. In order to reach an agreement, the committee used working groups to divide up the task, each group focusing on a different category. The first three working groups were the Data Type and Attribute Working Group, Primitive Data Format Working Group, and the Application Services Working Group.

In 1991, the protocol was first released for public review. In 1995 after two more public reviews, the BACnet protocol was finally published. BACnet very quickly became a widely accepted open protocol standard. Many companies announced their support for BACnet even before the final draft of the standard was released. Today BACnet is under continuous maintenance by ASHRAE.

1991
BACnet protocol is first released for public review

2006
BACnet Manufacturers Association & BACnet Interest Group of N. America combine to form BACnet International

1987
First meeting of ASHRAE Standard Project committee – BACnet development begins

1995
BACnet protocol is officially published

What is BACnet?

BACnet is a data communication protocol for Building Automation and Control Networks. It replaces the communication portion of each device it is applied to with a common, standard set of communication rules, enabling the full integration of building automation and control systems from multiple manufacturers.

BACnet enables devices to exchange information regardless of the particular service they perform. It does so by representing all information in a system in terms of 'objects'. This is a departure from the industry's traditional to use the term 'points', referring to sensor inputs, control outputs or control values with different characteristics depending on the manufacturer. BACnet instead defines a standard set of Objects, each of which has a standard set of properties that describe the Object and its current status to other devices on the BACnet network. BACnet's method of representing data enables BACnet devices from different manufacturers to work together.

Comparison of BACnet protocol to other protocols

Besides BACnet, there is another popular protocol for BAS and HVAC control - LonWorks. However, there are key differences between the two protocols. A close analysis of the differences between BACnet and LonWorks makes clear that the BACnet protocol is the best choice.

The first main idea explaining BACnet's superiority is that BACnet was designed specifically for HVAC control and BAS. This is an important distinction from LonWorks, which was not designed for complex system-level devices, nor was it designed specifically to meet the needs of the HVAC/ BAS industry. BACnet, developed specifically for Building Services, defines how all the elements of the Building Management System work together.

Uniquely, BACnet is applicable to every kind of building system: HVAC, Security, Access Control, Fire, Maintenance, Lighting etc. It offers compatibility with devices made by different vendors as well as with future generations of systems. This compatibility is enabled due to BACnet using the most advanced and flexible model for data representation - an object-oriented approach for representing all information within each device. BACnet's object-oriented approach allows developers to provide enhancements and additional features.

Another important benefit is that BACnet supports a wider range of communication transports than LonWorks. BACnet can communicate with different LAN technology for transporting BACnet application messages via BACnet routers, providing significant flexibility in choosing the best fit for each situation. Its high-speed capabilities provide room for future growth, while its flexibility in networking options allows it to be used in even small zone controller subnets. Ethernet capability allows connection directly to wide area networks that link remote building sites as well as multiple local area networks.

The fact that BACnet is the only protocol that was developed with the cooperation of nearly every major vendor of building automation, controls, and mechanical equipment evidences its reliability. BACnet is the only protocol to meet all the requirements for BAS and HVAC control – It is powerful, capable of meeting future communication needs, and meets all present needs throughout all system levels.

Major Systems Using BACnet

BACnet's benefits as a data communication protocol for Building Automation and Control Networks are evidenced by the fact that the major security and building management systems on the market are using it.

One such system is SIEMENS' DESIGO Building automation and control system, which utilizes BACnet in order to effortlessly integrate devices performing different kind of building services. Another example is Trend's building management system, which emphasizes the affordability of integrating new and existing systems, enabled by BACnet. Honeywell's, too, prides itself in "taking full advantage of leading open system standards such as BACnet..." in its building management system. In fact, every major security and building management system today comes equipped with the BACnet protocol as a result of the tremendous value it offers.

Benefits of Integration with a Security & Building Management Platform

Using the BACnet protocol with a security & building management platform enables security, fire detection, video monitoring, access control, HVAC and other building automation systems made by one company to communicate with systems made by another company. This simplifies the integration of all systems, and enables the use of a single interface for controlling and monitoring all systems. In addition to more convenient and efficient operation, having a single point of control creates synergies among the different systems and saves energy. Implementation of the BACnet protocol also ensures that the network infrastructure will support future changes to the system.

The use of a BACnet Driver with a security & building management platform also allows users to:
- Monitor and control a BACnet device in real time through the security & building management platform via corporate networks.
- Directly read or write to any accessible point (I/O or virtual) on a BACnet system.
- Read BACnet alarms or use the information received from BACnet to create alarms in the Control and Monitoring system.
- Log information from a BACnet system in standard or custom log files in the Control and Monitoring system.
- Provide additional information and supervisory control capabilities to the BACnet devices.

Means of integrating with a Security & Building Management Platform

Integrating BACnet with a security & building management platform enables information from a BACnet device to be integrated into the platform. The security & building management platform does this by converging information from BACnet devices and other systems so that all the information can be logged, reported, and used in building management and control applications.

A BACnet device protocol uses any of the following components:

1. Accumulator
2. Analog Input - Sensor input
3. Analog Output - Control output
4. Analog Value - Setpoint or other analog control system parameter
5. Averaging
6. Binary Input - Switch input
7. Binary Output - Relay output
8. Binary Value - control system parameter
9. Calendar - a list of dates, such as holidays or special events, for scheduling
10. Command - Writes multiple values to multiple objects in multiple devices to accomplish a specific purpose, such as day-mode to night-mode, or emergency mode
11. Device - Properties tell what objects and services the device supports, and other device-specific information such as vendor, firmware revision, etc.
12. Event Enrollment - Describes an event that might be an error condition (e.g., "Input out of range") or an alarm that other devices to know about. It can directly tell one device or use a Notification Class object to tell multiple devices
13. File - Allows read and write access to data files supported by the device
14. Group - Provides access to multiple properties of multiple objects in a read single operation
15. Life Safety Point
16. Life Safety Zone

17. Multi-state Input - Represents the status of a multiple-state process, such as a refrigerator's On, Off, and Defrost cycles.
18. Multi-state Output - Represents the desired state of a multiple-state process (such as It's Time to Cool, It's Cold Enough and It's Time to Defrost)
19. Multi State Value
20. Notification Class - Contains a list of devices to be informed if an Event Enrollment object determines that a warning or alarm message needs to be sent
21. PID Loop - Provides standardized access to a "PID control loop"
22. Pulse convertor
23. Program - Allows a program running in the device to be started, stopped, loaded and unloaded, and reports the present status of the program
24. Schedule - Defines a weekly schedule of operations (performed by writing to specified list of objects with exceptions such as holidays. Can use a Calendar object for the exceptions
25. Trend Log
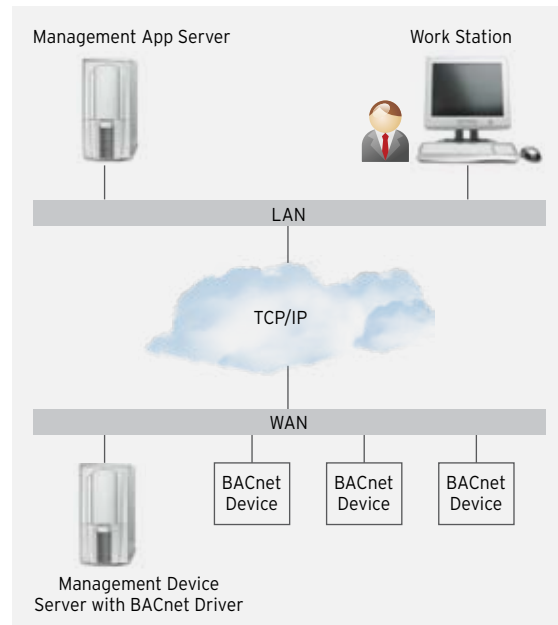
RISCO Group's SynopSYS™ and BACnet

RISCO Group is committed to being a manufacturing partner in the BACnet standard. RISCO Group's SynopSYS™ Security & Building Management Platform now provides an interface with BACnet compliant devices utilizing the BACnet protocol. SynopSYS™ converges security, fire detection, video monitoring, access control, HVAC and other building automation systems from multiple sites into a single management platform. It provides an overall picture or all sites via intuitive synoptic maps in real time. Empowering SynopSYS™ with the BACnet protocol increases its suitability for a larger variety of projects worldwide.

Summary

With its worldwide presence, BACnet is commonly accepted as the best choice for a data communication protocol for full-scale security and building automation. Its unique object-oriented model for data representation makes it the most advanced protocol of its kind, and provides maximum flexibility. BACnet can greatly enhance the performance and features of a Security & Building Management Platform such as RISCO Group's SynopSYS™, and enable more convenient and efficient operation of all integrated systems.

About RISCO Group

RISCO Group is a recognized leader in security technology, with over thirty years of experience in creating integrated security solutions for global markets. Boasting four dedicated divisions – Integration, Intrusion, Access Control and Integrated Video - RISCO Group provides innovative and reliable solutions for the ever-changing world of electronic security, from the remote site to the monitoring station. The company's robust applications and creative wired and wireless systems raise the bar on commercial, industrial, institutional and residential security worldwide. Flexibility, simple installation, ease-of-use, and reliability are carefully built into every RISCO solution.