

What every facility manager should know about BACnet.™

What is BACnet?

BACnet is a data communication protocol for building automation and control networks. It is neither software, hardware, nor firmware. Think of it as a standardized set of rules that governs how computers exchange information. These rules enable the integration of control products made by different manufacturers into a single, cohesive system.

While it is first being used in HVAC applications, the BACnet standard is designed to support other building control systems such as life safety, security and lighting.

What benefits does BACnet bring to customers?

The ability to integrate products and systems from different manufacturers gives facility owners and managers newfound flexibility. Using BACnet, owners have the freedom to competitively bid expansions and additions, and select the manufacturer(s) that best meets the requirements of the project at the best price. Owners can select the most appealing technologies and services as they become available and gain investment protection because current systems can be expanded without replacing the entire system.

BACnet also facilitates single-workstation control in campus environments composed of a variety of different manufacturers' control systems (or islands of automation). BACnet is an ANSI/ASHRAE standard which means it is controlled by a standards body. It cannot be significantly changed without public review. Customers have a say in any changes that may affect the protocol. Proprietary or public (open) protocols can be changed at the discretion of the creator without the customer even being aware.

How does BACnet work?

The diagram below shows an example of a large control system. While BACnet can be used at many different places in a system, the same basic data communication elements are always involved. These are:

1. **What is Communicated:** BACnet models common building automation and control functions as collections of information called objects. BACnet defines 18 standard objects including analog inputs and outputs, binary inputs and outputs, and schedules.
2. **How to Communicate:** BACnet defines methods for exchanging data. These are called services and are used by system suppliers to read and write information between systems.
3. **Local Area Networks (LANs):** BACnet can work over a variety of commonly available network technologies used in our industry including Ethernet, ARCNET EIA-232, EIA-485 and the LonTalk™ data link layers.

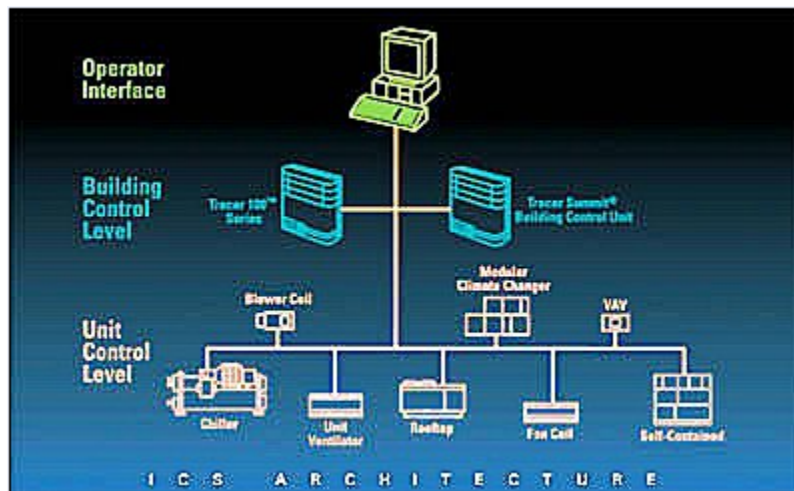
How do I specify BACnet solutions?

The BACnet standard provides some tools to help in creating specifications. These are called "conformance classes" and "functional groups."

Conformance classes define a hierarchy of BACnet communication capabilities from simple to complex. For example, a very basic device might only be able to respond

to read commands. Functional groups allow a specifier to add functionality to products of any conformance class based on specific building control requirements.

In order to specify BACnet, a normal DDC control specification can be used with the proper language inserted to achieve the functionality the owner desires. An ASHRAE committee, GPC 13P, is working on a guideline for the specification of DDC control systems. This guideline will contain, among other things, a sample BACnet specification. A public review version of this guideline is expected in 1997.



Where did BACnet come from?

BACnet was initiated in response to the needs of building owners. It is the result of over eight years of collaboration and consensus building under the auspices of ASHRAE. Because the protocol was intended to be a standard, the process was conducted under full public scrutiny. Every segment of the building controls industry cooperated in this process, including end users, universities, HVAC and controls manufacturers, government agencies and consulting firms.

Is BACnet real ... has it been installed in real facilities?

BACnet debuted in February 1996, at the International Air-Conditioning, Heating, Refrigerating Exposition. Twelve suppliers demonstrated interoperable BACnet implementations for applications including chiller plants, zone control systems, air handlers, lighting, and fumehood controls. BACnet has been installed in numerous field sites worldwide including buildings in the US, Germany, Switzerland and the UK. BACnet has also been adopted as a pre-standard in the European Community. As more companies implement the standard, this number is expected to grow.

What's next?

ASHRAE has formed a standing standard project committee to oversee BACnet's interpretation and refinement. The agenda includes:

- Create a program to certify product compliance with the BACnet standard.
- Enhance the use of BACnet over the Internet Protocol (IP).
- Specify standard formats for trend and event logs.
- Define additional standard objects specific to typical HVAC and other building equipment.

- Fine tune conformance classes and functional groups to simplify specification of BACnet systems.

More questions than answers about interoperability?

We understand. A practical solution to interoperability will be a turning point for our industry, similar to the shift from pneumatics to direct digital control (DDC). Interoperable systems promise significant benefits, especially for building owners. Those advantages will be evident when owners have the power to exercise more freedom when choosing products and partners to support their building plans.

Standards are the key to success.

In recent years, the commercial building industry has attempted to provide customers with interoperable system choices through a variety of integration techniques. While these offerings have shown short-term results, interfaces linking proprietary protocols are not reasonable, long-term solutions. BACnet, an industry-consensus standard protocol, provides the first practical answer to interoperability. Only through well documented and measurable standards like BACnet will owners be assured of consistent solutions for today and tomorrow.

BACnet is an approved standard today, others may follow.

In 1993, Trane was the first manufacturer to announce support of the BACnet protocol for connecting building systems. Both ASHRAE (American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.) and ANSI (American National Standards Institute) have approved BACnet as a standard for commercial building communications. Today, Trane is the leader in demonstrating BACnet's success in a variety of commercial and industrial building applications.

Currently, BACnet is the only standard protocol adopted and maintained by an industry body. However, it is likely other protocols will emerge and may become valuable tools to assist in solving the interoperability puzzle. Trane is working closely with other industry professionals to define standard uses of these protocols which lead to their widespread application.

Interoperability is only one piece of the puzzle.

Energy efficiency, occupant comfort and indoor air quality concerns are among the issues facing building professionals today. Partnering with suppliers who take responsibility for complete system performance is an important element of addressing these challenges. Remember, open systems alone do not guarantee a facility that measures up to today's demanding requirements.

Trane has over 80 years experience in delivering system solutions that work. Contact your local Trane commercial office for building system solutions that address your needs for interoperability.