

BACnet Goes to Europe . . . and Beyond

The success of the data communication protocol for building automation and control networks (BACnet™) in Europe is critical to its success here in the U.S.

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Earlier this century, isolationist Americans often thought that whatever happens in Europe just doesn't matter. One cold and two hot wars later, that provincial view has been shown to be wrong at best-- dangerous at worst.

The importance of Europe is being proven again today in the field of building controls. Consider the current state of U.S. building controls companies. Think who owns, controls, and runs them. Think where the main design and engineering work is often done. Granted, there are still a small number of native controls companies, but in this day and age of globalization, such companies are the exception, not the rule. The success of BACnet (a data communication protocol for building automation and control networks) in Europe is thus critical to its success here.

One important European activity is the on-going effort within the European Union (EU) to develop standards that apply to all its member countries. This work is the responsibility of the Brussels-based European Committee for Standardization, generally known as CEN (pronounced "sen" based on its French designation, Comité Européen de normalisation). CEN draws its membership from the national standards bodies of the EU and European Free Trade Agreement countries, a number of affiliate countries (mostly former Soviet states), and several European industry associations. CEN's stated aim is "to draw up voluntary European standards and promote corresponding conformity of products and services in areas other than electrotechnical and telecommunications."

To accomplish its work, CEN is organized into 16 sectors, one of which is Heating, Cooling and Ventilation. Of CEN's 251 technical committees, 18 work in this sector. The best known of these to people working with BACnet is TC247, Controls for Mechanical Building Services.

Space does not permit discussing all of TC247's work. Suffice it to say that one of its four areas of concern is standards for system neutral data transmission for HVAC applications. To develop--or adopt--appropriate standards, TC247 has created a three-level hierarchical model of a building automation and control system. The three levels are called management, automation, and field.

According to TC247, the three levels should be viewed in terms of control system functionality rather than any particular hardware, software, or communication architecture. The management level, for example, is where the majority of operator interface functions reside. Additional functions include communication with controllers, monitoring, alarm annunciation, trend logging and statistical analysis, centralized energy management functions, and communication with, or coordination of, dedicated non-HVAC systems such as fire alarm and security control. As a practical matter, most of the devices at this level are personal computer workstations.

The automation level is where the majority of real-time control functions are carried out. The devices tend to be general-purpose, programmable controllers.

The field-level contains the devices that connect to sensors and actuators. We would tend to think of field-level devices as unitary or application-specific controllers.

The problem with this and any other hierarchical approach to modeling control systems is that not all possible system configurations fit the model. The model also raises many questions. Where exactly is the dividing line between one level and the next? How functional does a field-level device have to become, for example, to be promoted to the automation level? Can a management level device carry out control functions?

Having agreed to the functional hierarchy described above, TC247 has been selecting protocols that it believes to be appropriate for each of the levels as potential CEN standards. This has been the fun part. Not only do the Europeans have all of the usual commercial interests of manufacturers to deal with, they must also reconcile national interests and preferences. Not surprisingly, they have been unable to agree on a single protocol for all of their needs. Moreover, to avoid near-term bloodshed, they have devised the concept of a pre-standard. Pre-standardization allows CEN committees to select multiple candidates for a particular role with a trial period of three to five years during which the technical and commercial viability of the candidate standard can be assessed. As a practical matter, this also defers the day of reckoning when the committee has to make the hard choice where one pre-standard is in and another is out.

In terms of the three-level model, there are now eight protocols vying for CEN standardization. They are shown in Table 1.

Table 1. European protocol standards for building automation.		
Level	Protocol	Status
Management	BACnet FND (DIN V 32735)	ENV 1805-1, Feb. 1997 ENV 1805-2, Feb. 1997
Automation	BACnet PROFIBUS (EN 50170, Vol. 2) WorldFIP (EN 50170, Vol. 3)	prENV 13321, approved by TC 247, CEN formally voting from 8/20/98 until 10/20/98
Field	BatiBUS (NF C 46- 620-623) EHS EIB (DIN V VDE 0829) LonTalk	prENV 13154-2, adopted April 1998, applies to all four protocols
CEN = European Committee for Standardization DIN = German standard EIB = European Installation Bus EHS = European Home System EN = European standard ENV = European pre-standard FND = Firm Neutral Data Communication NF = French standard		

As the table shows, BACnet has been adopted, or proposed, as a pre-standard at the top two levels. The other protocol at the management level is the German Firm Neutral Data Communication standard (FND). This standard, which was designed to connect "islands" of devices that continue to communicate using proprietary protocols (a technique advocated today mostly by those who do not want standards), was developed in the 1980s as a result of a German government initiative. As with so many federal government initiatives (regardless of which federal government), this one has not found great favor within the commercial sector. There are only a small number of operating FND installations, and in any case, it is highly unlikely that even the newly upgraded version, FND 2.0, will ever be deployed outside of Germany.

At the automation level, BACnet has two competitors, the German PROFIBUS and the French WorldFIP. "PROFIBUS" stands for Process Field Bus and was fundamentally designed to meet the needs of industrial control processes. In 1993, the PROFIBUS User Organization began publishing a series of profiles describing how subsets of PROFIBUS functionality could be used for various other applications, one of which is building automation. At the moment, however, the building automation profile is not a part of the proposed CEN standard. Like PROFIBUS, WorldFIP ("FIP" stands for the Factory Instrumentation Protocol) is a protocol that was designed for industrial process control applications. Although both PROFIBUS and WorldFIP are quite popular in their home countries, it is a matter of speculation how much favor they will

find elsewhere in the EU. This leaves the door wide open for BACnet as the protocol of choice, particularly as it is the only one of the three expressly designed for building automation and control.

The bottom line is that BACnet's presence at both the management and automation levels means that it has an extraordinary opportunity to become the dominant protocol standard throughout Europe. This is made even more likely by the fact that, in the case of public procurements, CEN's voluntary standards are considered mandatory by CEN member governments.

Continuing down the hierarchy, the CEN field level is currently the site of a brutal struggle among the competitors. Having gone head-to-head amongst themselves for several years, the (French) BatiBUS, the (German) European Home System (EHS), and the (German-developed) European Installation Bus (EIB) organizations have decided to join forces against the American intruder, Echelon Corp.'s LonTalk protocol. This has resulted in a well-publicized convergence project that has as its goal the amalgamation of the three protocols into some kind of compatible, if not uniform, new entity, which might be able to compete more effectively against LonTalk throughout the EU. The three groups claim that they will be far along sufficiently to sponsor a demonstration booth at December's gigantic "elec 98" trade fair in Paris.

BACnet is also gaining ground in the broader international arena. Here, work within the International Organization for Standardization (ISO) is paramount. Basically, ISO is to the entire world as CEN is to the European nations. It is made up of the national standards bodies of 128 countries with the American National Standards Institute representing U.S. interests. The scope of ISO standardization covers everything except electrical and electronic engineering, which is the responsibility of the International Electrotechnical Commission. There are currently 184 technical committees working on everything from soup to nuts and bolts.

Working Group 3 of ISO committee TC205, Building Environment Design, has recently adopted BACnet as its working draft for a building control protocol that could become a global standard. The U.S. and Japanese delegations are currently attempting to resolve differences in the way they think BACnet should be used over the Internet. This effort is on-going with the next meeting of the committee scheduled to take place this November in Brussels.

While BACnet's stature in the world of standards is clearly rising, its growing acceptance among multinational manufacturers, specifying engineers, and building owners is also on the upswing. In May, for example, several manufacturers, including Alerton, Johnson, Honeywell, and Landis & Staefa, spearheaded the formation of the European BACnet Interest Group (BIG) in Frankfurt by signing up as "sponsors," each responsible for an annual contribution of about 11,000 U.S. dollars. The BIG kick-off meeting was attended by about 50 people from all interest areas, including manufacturers, universities, governmental organizations, consultants, engineers, and building owners.

Perhaps most significant of all, BACnet jobs are springing up all over. One of the most impressive jobs in Europe is the Reichstag complex in Berlin. This multi-building complex will soon house the German parliament, the Chancellor, and several government agencies. The designers decided to specify BACnet as the means of tying the various newly constructed state-of-the-art buildings to a central monitoring and control facility in the totally renovated Reichstag building itself, located symbolically in the heart of a unified Germany.

Other notable overseas jobs include the Cologne-Bonn and Athens airports; hospitals in Innsbruck and Leijden; facilities in Hong Kong, Singapore, Korea, Sao Paulo, Pretoria, Auckland, and Sydney; and even the McMurdo Sound naval base in Antarctica. Thus, there is some BACnet on every continent. **HPAC**

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