

Interoperability Best Practices Based on the BACnet Standard

Overcoming lowest-first-cost procurement requirements

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Many owners and specifiers are constrained by procurement requirements such as “lowest first cost.” This can be an expensive proposition as far as mechanical systems and their associated controls are concerned. Consider that most large building automation systems (BAS) end up being integrated with other types of systems and have centralized operations and maintenance. We have to stop thinking about “controls” as an accessory that is added after the fact when, actually, the choice of control-system capabilities is the key driver of cost over the life cycle of mechanical equipment.

The idea that controls make up 10 percent of a project’s cost is an artifact of the first-cost approach. Increasingly, people are coming around to the “total-system-cost” model, which considers the cost of interoperability, training, maintenance, custom integration, expansion, energy use, and long-term procurement as part of an initial purchase. Associated costs can dwarf the installation and procurement costs of a mechanical system. So what can a buyer do to embrace this idea under the yoke of lowest-bidder competi-



tive procurement types of requirements?

A common complaint is that the low-bid process often leaves facilities staffs with the burden of supporting, operating, and maintaining multiple types of BAS, with potentially no means of integrating them. Fortunately, huge advances in standardization and interoperability technology have created the opportunity to do something about this problem. But interoperability is not as simple as saying, “Yes, I want some.” You must make specific choices that incorporate interoperability into designs and specifications. By specifying the interoperability you need, you still can use a lowest-first-cost procurement process and end up with some degree of control over the interoperability of a system.

Compared with systems that have little or no interoperability, systems with interoperable components or subsystems may come with a cost. That cost, however, often is a very good investment in terms of life-cycle cost. The key to minimizing the cost is careful planning during

design and specification. It’s not about which technology should be used or who plugs into whom, it’s about defining requirements for BAS in a manner that is supportive of the level of flexibility you want and assuring that the cost of this flexibility is absorbed during the procurement process.

To reap the benefits of a total-cost model, you must be assured of having true interoperability of systems and components at various levels. Strategically, this will allow you to leverage training and maintenance costs and intersystem optimization and integration. The extent to which interoperability is possible and necessary is unique to each facility and operation. But regardless of scope, interoperability should be approached as another dimension of requirements that is as critical to BAS and mechanical systems as physical size, weight, voltage, horsepower, and other engineered details. Specifications for interoperability should include clear definitions of the scope of interoperability required between various systems and subsystems, based on existing interoperability standards.

In my experience, the best practice is to base interoperability on international standard ISO 16484-5, more commonly known as ANSI/ASHRAE Standard 135-2001, *BACnet—a Data Communication Protocol for Building Automation and Control Networks*. This standard contains definitions known as BACnet Interoperability Building Blocks that are extremely useful in the design and specification of interoperable systems. Because BAS interoperability may rely on dozens or even hundreds of types of specialized standard interactions, some expertise is

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required to specify more-complex detail effectively. Increasingly, consulting A/E firms are rising to the challenge and gaining the training and expertise necessary to assist owners in the design process for not only short-term interoperability specification, but longer-term strategic thinking. But choose your advisors carefully! A lack of expertise in interoperability design or too much old-school thinking won't provide the escape velocity you need to overcome the gravity of lowest-first-cost procurement.

Following are reasons why interoperability best practices based on BACnet are worth pursuing:

- The cost of interoperability is minimized through the use of control systems, mechanical equipment, and related subsystems based on BACnet, which itself carries little or no premium over proprietary technologies for communications.

- Training always is an issue for owners forced to have multiple types of equipment from different vendors. However, systems that are based on BACnet (especially those that embrace BACnet at many levels) have many similarities that allow training applicable across systems from different vendors to be leveraged.

- Maintenance, as with training, is more complex when multiple vendors must be supported. However, the use of standards such as BACnet can provide significant benefits because of the availability of third-party diagnostic and troubleshooting tools.

- Custom integration always has been expensive and problematic; however, standards such as BACnet have largely redefined integration tasks. Many issues that previously required custom-designed integration solutions now can be addressed easily through native BACnet functionality or third-party solutions.

- Expansion always was an issue when there was little or no opportunity for integrating—let alone interoperating—facilities and systems with equipment from different vendors. By choosing an interoperability-oriented design based on BACnet, specifiers can substantially improve flexibility in terms of expansion and the number of choices and options available for the future.

- Intersystem optimization is difficult or impossible to achieve without an interoperable design.

Owners should seek designers with proven expertise in applying interoperability best practices, while designers who lack these skills should rise to the challenge and expand their training and knowledge in these areas.

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