Chapter 5

Interoperable Control Systems

Control System Interoperability

There are three distinct echelons in any digital control system: the control level, the data transfer level, and the user information level. At the control level, functional devices containing intelligent microprocessors provide localized control over building systems and equipment. The data level is responsible for integrating data from multiple controllers and, using software, adds features to the overall system including trend data collection, alarm management, energy consumption reporting, and the like. The information level contains the operator workstations that monitor the activities of the control and data levels and provides a graphical interface between human operators and the network equipment operating at the data level.

In a perfect world, control systems for buildings could be constructed of devices at each of these layers and could be interchanged and added onto to build the optimal system for any given building HVAC application. However, there are constraints that have been perplexing building controls engineers since the advent of microelectronic systems. Although each of the devices at the control and data levels contain embedded microprocessor intelligence, they are isolated from each other by an inability to communicate that is caused by the proprietary
nature of their design. Direct digital control (DDC) manufacturers design components to work within systems of their own manufacture. This is done to protect their investment in the research and development necessary to develop their systems, and to provide a future market for their products as building owners and operators expand or otherwise change the configuration of their control systems. Since the advent of DDC systems this problem has perplexed building owners, who are often frustrated by the inability of one brand of control device to communicate with another. This prevents the building owner from adding to an existing system devices that serve a future need, and the inability to integrate the operation of these intelligent new devices into the overall configuration of a building control system network only makes the problem worse.

In recent years, demand for open or interoperable systems has grown to such an extent that control manufacturers can no longer ignore it. Although the DDC market today is dominated by suppliers of nonintegrated, proprietary systems, there fortunately exists the underlying technology to support the development of standard configurations and communication protocols for network control systems.

As a result, the natural evolution from closed, customized or otherwise proprietary systems toward the development and proliferation of