

# New Technologies and the Challenge They Pose to Building Fire Alarm Systems

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Building Fire Alarm Systems, courtesy of Edwards

In today's world of instant access to information and low-cost connectivity, owners of building fire alarm systems are investigating options to integrate or connect to buildings' fire alarm systems, thus utilizing a network infrastructure.

The building fire alarm system's purpose is to indicate the existence of heat, fire, smoke, or other emergencies within the building. The word "indicate" means to notify the occupants so that they take the proper steps to move to safety. As manufacturers of building fire alarm systems, Edwards is often asked about integration options as well as current industry and regulatory developments. Here are a couple of them.

## Why can't I use my own business network infrastructure to interconnect the building fire alarm system(s)?

In theory, it is possible as long as the following NFPA 72<sup>1</sup> criteria are met:

23.8.2.6.1 All signal control and transport equipment (such as routers and servers) located in a critical fire alarm or emergency control function interface device signaling path shall be listed for fire alarm service, when the following conditions are met:

 The equipment meets the performance requirements of 10.3.5.

- The network components shall be capable of operating:
  - ♦ At 85 percent and at 110 percent of the nameplate primary (main) and secondary (standby) input voltage(s)

- ♦ At ambient temperatures of 0°C (32°F) and 49°C (120°F)
- ♦ At a relative humidity of 85 percent and an ambient temperature of 30°C (86°F)

 The equipment is provided with primary and secondary power and monitored for integrity as required in Section 10.6, 10.6.9, Section 10.19, and Section 12.6.

- Key highlights are:

- ♦ Equipment must be provided with a primary and secondary source of supply.
- ♦ Supply sources are required to be monitored at the point of connection.
- ♦ Failure of either supply must result in a trouble signal.
- ♦ An uninterruptable power supply is allowed as long as it is connected and monitored in the same manner as the building fire control panel.
- ♦ Monitoring shall not be required for the output of an engine-driven generator that is part of the secondary power supply, provided that the generator is tested in accordance with Chapter 14.
- ♦ Where the digital alarm communicator transmitter is powered from a protected premises fire alarm system control unit, power failure indication shall be in accordance with 10.6.9.1. and be delayed by 60 to 180 minutes before transmission to the supervising station.
- ♦ All means of interconnecting equipment, devices, appliances, and wiring connections shall be monitored for the integrity of the interconnecting conductors or equivalent path so that the occurrence of a single open or a single ground-fault condition in the installation conductors or other signaling channels is automatically indicated within 200 seconds.
- ♦ Shorts between conductors are not required to be monitored for integrity, unless it is on a notification appliance circuit, specified as class X or a two-way telephone communication circuit.

 All programming and configuration ensure a fire alarm system actuation time as required in 23.8.1.1.

- Actuation of alarm notification appliances or emergency voice communications, emergency control function interface devices, and annunciation at the protected premises shall occur within 10 seconds after activation of an initiating device.

<sup>1</sup> NFPA 72 National Fire Alarm and Signaling Code, National Fire Protection Association, Revised 2013

**4** System bandwidth is monitored to confirm that all communications between equipment that is critical to the operation of the fire alarm system or emergency control function interface devices take place within 10 seconds; failure shall be indicated within 200 seconds.

**5** Failure of any equipment that is critical to the operation of the fire alarm system or emergency control function interface devices is indicated at the master fire alarm control unit within 200 seconds.

In most cases, it is not practical to meet all of these requirements on the entire building's network infrastructure. In order for network infrastructure products to be listed as part of building's fire alarm system they must have the same level of performance and reliability.

Products used in the business network infrastructure are not required to be tested for any performance outside the guidelines of the Federal Communications Commission (FCC). Many of these products are voluntarily tested unlike the mandatory testing (listing) of a building fire alarm system. Information technology equipment (ITE) products are typically tested by third parties, such as UL and ETL, for compliance to product standards. ITE standards are strictly product safety standards.



Another area of concern is the portability of the building's network infrastructure. What happens to the alarm system when tenants move? Do they take part of the fire alarm system with them, thus disabling the building fire alarm system? What happens when the network infrastructure is changed or upgraded? The system may require retesting per the following:

*14.4.2.5 Changes to the system's executive software shall require a 10 percent functional test of the system including a test of at least one device on each input and output circuit to verify critical system functions such as notification appliances, control functions, and off-premises reporting.*

What is changing to give the owner more choices? The NFPA 72 Technical Committee on Signaling Systems for the Protection of Life and Property has put together a task group of industry experts to work through these problems and will write proposals to update the code this cycle. The proposals will be a first step in clarifying the options customers have regarding networking their building fire alarm systems.

## Why can't I use my own computer to monitor and control my building fire alarm systems?

*10.3.1 Equipment constructed and installed in conformity with this Code shall be listed for the purpose for which it is used.*

Again, like the building's network infrastructure discussed earlier, the computer is considered part of the building's fire alarm system and must be tested and listed to the same requirements of the building's fire alarm system. As with the other pieces of the building's network infrastructure, work is underway to allow flexibility in the use of this equipment.

*12.6.5 Monitoring for integrity shall not be required for connections to and between supplementary system components, provided that a single open, ground-fault, or short-circuit conditions of the supplementary equipment or interconnecting means, or both, do not affect the required operation of the fire alarm and/or signaling system.*

Supplementary system components may include a computer used to monitor—not control—the building fire alarm system. It should not be relied on in the course of a life safety event. In many cases, this is acceptable for system monitoring of status changes and getting reports to aid in proper maintenance.

Additionally, proposals have been put forth to UL 864 Control Units and Accessories for Fire Alarm Systems to allow for the use of redundant or fault tolerant systems in supervising stations only, but could lay the ground work for use in protective premise systems as more work and study is done.

## What's Next?

What is important to note is that there is ongoing work in this area. In the past, building fire systems were installed and maintained exclusively by fire professionals with very little connectivity to the outside world. The role of the building fire system is now expanding to include other life safety functions that require interaction with other building systems such as security; mass notification; and heating, ventilation, and air-conditioning systems.

The building network infrastructure needs to be a part of the solution and must perform at a level of reliability to ensure all of the occupants are protected in the instance of a life threatening event. People with expertise in building fire systems, other life safety systems, and information technology need to understand each other's role in this process so we can all move forward. ☺

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