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It's A Wireless World

by Dean K. Wilson, P.E.

Question; I'm planning a new fire alarm system. Am I still stuck with wire to interconnect the system components, or can I use some new wireless technology?

Answer: The answer to this question is the same universal answer to all fire protection questions: "It depends."

NFPA 72-1999, *National Fire Alarm Code*, has a number of code-complying system alternatives that use wireless technology. Some of these alternatives apply to systems within protected buildings. Others apply to the interconnection between a protected premises and a supervising station.

In Chapter 3 of the *Code*, "Protected Premises Fire Alarm Systems," Section 3-10 offers "Special Requirements for Low-Power Radio (Wireless) Systems.

> 3-10.1* Compliance with Section 3-10 shall require the use of low-power radio equipment specifically listed for the purpose.
>
> A-3-10.1 Equipment listed solely for dwelling unit use would not comply with this requirement.

The specific, highly technical nature of the requirements in Section 3-10 has naturally limited those manufacturers who have qualified for listing. For many years Underwriters Laboratories Inc.'s *Fire Protection Equipment Directory* has indicated that only one manufacturer, World Electronics of Coral Springs, Florida, has obtained such a listing.

Exploring the other requirements of this Section of the *Code* reveals that low-power radio systems meeting these particular requirements connect fire alarm initiating devices to a fire alarm system control unit within a protected premises. This means that manual fire alarm boxes, heat detectors, smoke detectors, and sprinkler waterflow alarm initiating devices, to name a few, will connect to the fire alarm system control panel without the use of wires. In addition to the fire alarm initiating devices, a variety of supervisory initiating devices, including sprinkler control valve supervisory devices, sprinkler system air pressure supervisory devices, fire pump supervisory devices, again, to name a few, will all connect to the fire alarm system control unit without the use of wires.

A primary 9 volt battery supplies power for the individual miniature radio transmitter at each device. In the case of smoke detectors, another 9 volt battery supplies power to operate the device itself.

All of the typical *Code* requirements uniquely apply to this low-power radio system. For example:

> 3-10.4 Monitoring for Integrity.
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> 3-10.4.1 The low-power radio transmitter shall be specifically listed as using a transmission method that is highly resistant to misinterpretation of simultaneous transmissions and to interference (for example, impulse noise and adjacent channel interference).

> 3-10.4.2 The occurrence of any single fault that disables transmission between any low-power radio transmitter and the receiver/control unit shall cause a latching trouble signal within 200 seconds.
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> *Exception: Where Federal Communications Commission (FCC) regulations prevent meeting the 200-second requirement, the time period for a low-power radio transmitter with only a single, connected alarm-initiating device shall be permitted to be increased to four times the minimum time interval permitted for a 1-second transmission up to the following:*
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> *(a) Four hours maximum for a transmitter serving a single initiating device*
>
> *(b) Four hours maximum for a retransmission device (repeater) where disabling of the repeater or its transmission does not prevent the receipt of signals at the receiver/control unit from any initiating device transmitter.*

In addition to this low-power radio system, NFPA 72-1999, *National Fire Alarm Code*, offers four supervising station transmission technologies to connect protected premises fire alarm systems to a supervising station. Section 4-5 provides for:

> 5-5.3.2.3 Digital Alarm Radio System (DARS).
>
> 5-5.3.4 Two-Way Radio Frequency (RF) Multiplex Systems.
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> 5-5.3.5 One-Way Private Radio Alarm Systems.
>
> 5-5.3.7 Private Microwave Radio Systems.

These wireless systems can replace a wired connection between a protected premises fire alarm system and a central station, proprietary supervising station, or a remote supervising station.

Specific Code requirements, again, tend to limit the number of manufacturers who have ventured into providing this technology. Only one manufacturer, Ademco, has obtained listing for a product to provide either a Digital Alarm Radio System or a One-Way Private Radio Alarm System.

Similarly, only one manufacturer, Repco Incorporated of Orlando, FL has obtained listing for a Two-Way Radio Frequency (RF) Multiplex System.

Finally, NFPA 72-1999, *National Fire Alarm Code,* offers requirements for a wireless system for use as a public fire alarm reporting system. When a protected premises fire alarm system connects as an Auxiliary fire alarm system to the public fire alarm reporting system, Sections 6-5.12 “Coded Radio Street Boxes,” and 6-14 “Coded Radio Reporting Systems” would apply.

In fact, the requirements for the coded radio street box system has set the pattern for the requirements of all other wireless fire alarm systems. The success of the many locales that employ these radio boxes to enhance the fire protection of their communities gives a strong vote of confidence to wireless technology.

Will all fire alarm systems someday communicate without wires? That remains a mystery. But if the burgeoning of wireless technology within the information technology industry serves as a valid example, it may not be very long before manufacturers relegate the wired fire alarm system to the pages of history.

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