Intrusion Detection: Hardwire vs Wireless Alarm Systems

When selecting an alarm system, we are given two choices: hardwire or wireless. This is the decision that leads security professionals to ask, “Which is better?” The answer tends to come down to the individual needs of your facility. To determine which system would best suit your organization, let’s review the pros and cons for both hardwire and wireless alarm systems.

**HARDWIRE SYSTEMS**

Hardwire systems consist of physical copper lines that run between each sensor/detector and a central processing unit or alarm control panel (ACP). Because system wires are physically installed and connected to the ACP, many industry professionals consider hardwire systems to be a more reliable way for alarm devices to communicate with the ACP. These security professionals believe that because metallic wires offer a positive connection, there’s less opportunity for anything to go wrong, thus being more reliable — and in a sense they are correct. In conjunction with a small component installed at the end of each circuit, the ACP monitors the physical connection it has with each sensor and detector through the wires. That small component is referred to as an End-of-Line (EOL) Resistor. Should someone short the circuit or cut one of the wires while the system is armed, the APC will detect it, trigger the alarm, sound a local trouble alert and upon being disarmed, alert people in the facility. The Central Monitoring Station also receives the same information, in turn, notifying the emergency contacts and, if needed, local law enforcement.

The hardwire lines that make this type of system more reliable are also what can cause it to be more expensive. Due to the length of wire that may need to be run throughout your facility, labor costs can be quite a bit higher than a wireless option.

**HARDWIRE ALARM SYSTEMS**

**PROS**
- Considered more reliable
- Short circuited or cut wire detection and alert notification

**CONS**
- Potentially higher installation costs
- Physical lines vulnerable to both natural and deliberate outages
The belief by security professionals that hardwire systems are more secure and reliable may have you thinking that hardwire is the only way to go, but that is not necessarily true. Depending on the size and needs of your facility, a wireless system may be the better choice. Instead of using physical wires, wireless systems utilize radio waves to communicate to the ACP. The ACP supervises the connection it has with each wireless sensor and detector; a process where each transmitter periodically sends signals to the ACP. These radio signals are sent from each transmitter and typically received by a radio receiver built into the ACP. Radio signals eliminate the risk of wires being cut or short circuited, essentially making the systems almost tamper-proof. Therefore, deliberate outages are rare — one of the benefits of a wireless system. It is also important to note that both hardwire and wireless systems are monitored by a central monitoring station. The only significant difference is how communications are sent to the ACP (via hardwire or wireless transmission).

There are cases, however, when a wireless setup won’t have the necessary range to cover an entire facility. As a solution for limited range, repeater units and/or multiple receivers are installed throughout the facility. In some product lines, the receiver can be externally positioned or the alarm company may decide to install both wired and wireless devices together. There is no set formula when it comes to alarm system designs, as every location is different.

An additional benefit of a wireless system is costs associated with installation labor are reduced, since physical wire does not need to be pulled. However, the hardware itself carries a higher cost.

### Selecting A System That Best Meets Your Needs

Truth is, whether it’s wireless or hardwired, you are sure to receive effective, quality, reliable protection no matter what method of signal transmission you use. The ACPs for both hardwire and wireless systems continually look for faults that might occur. This includes the sudden disappearance of a transmitter’s supervisory signal over a given period. The removal of the plastic cover from a sensor transmitter, which means someone is about to disable it; the removal of the sensor from the wall, door, or a window frame; as well as an internal battery in the process of losing its power. Many of these situations will prompt the ACP to report a supervisory condition to the Central Monitoring Station.

Before you make your final decision to go with hardwire, wireless, or even a hybrid, ask yourself the following questions about what’s most important to you:

- **Security and reliability?** How important is it to you to have the reliability of a hardwired system? How important is it to you to have the virtually tamper-proof nature of a wireless system? This answer typically depends on your industry and type/value of the assets you are protecting.
- **Is it cost?** If it’s cost, wireless is typically the less expensive choice as labor hours are reduced.
- **Do you have a flexible timeline?** If you have a short window of time to select and install an alarm system, wireless systems can typically be up and running in a shorter amount of time.
- **Does your facility have obstacles that could make it difficult to install a hardwire system?** If it does, wireless may be a better choice.
- **What is the size and construction material of your facility?** For large-size facilities or facilities made of materials that may block a wireless signal, you may want to choose hardwire or a hybrid of both system types.

With any product, there are positive and negative aspects and there may not be a definitive answer as to which is best. And again, it typically comes down to the individual needs of your facility. But if you find yourself torn between the two, consider a hybrid ACP. Hybrid ACPs offer the best of both worlds, as they will accommodate both methods of connectivity. In any case, your trusted security provider will be able to guide you in this decision to make the right choice for your facility.