White Paper

DMP Two-Way™ Wireless System Offers a Competitive Edge

Alarm systems that use wireless technology have seen many advances and have grown in popularity since they were introduced several decades ago. Security companies and their customers appreciate the ease of installation and operation of wireless systems in comparison to traditional wired alarm equipment. But not all wireless alarm systems are equally reliable or easy to use. In this white paper we discuss the advantages of the technology and design of DMP Two-Way Wireless systems in comparison with other offerings available today.

Unlicensed spectrum requirements

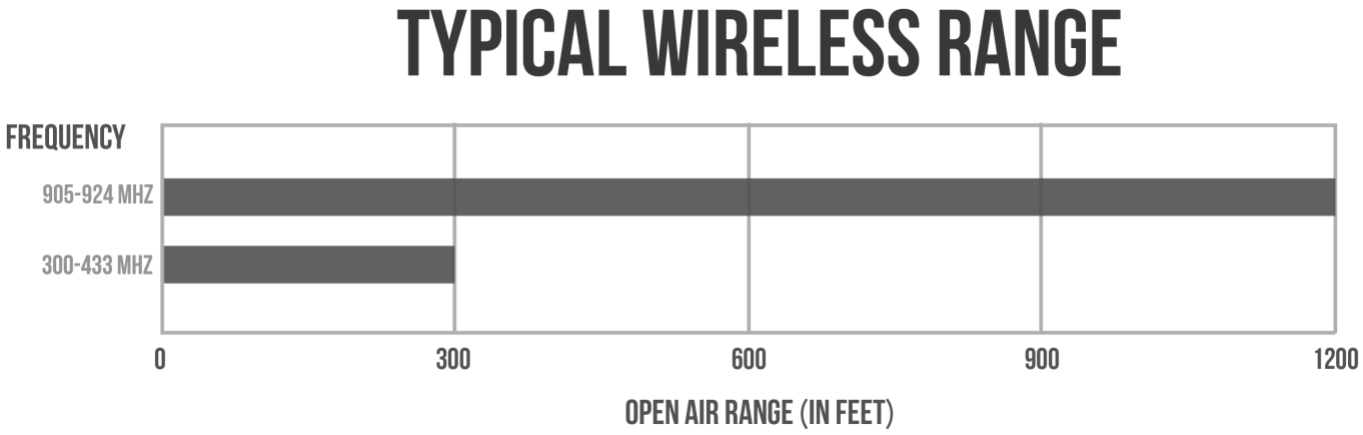
DMP Two-Way Wireless systems operate in the frequency range between 905 and 924 MHz — an unlicensed radio wave or spectrum band that is relatively uncluttered. Although manufacturers at one time made cordless phones operating in this band, most of them have now switched to other bands.

Some other alarm system manufacturers offer wireless products that operate in an alternative unlicensed band range between 300 and 433 MHz. This is a more cluttered band and to help prevent interference with other devices, regulators have put strict limits on this spectrum band. Equipment operating in this band is required to operate at a lower power level than equipment operating in the 905-924 MHz band, reducing the maximum distance that radio signals can travel.

DMP Two-Way Wireless products can be placed up to 1,200 feet from the receiver. With systems operating in the 300 to 433 MHz band, the maximum recommended distance between each sensor and the receiver is 200 feet. Even with a repeater that extends the distance to approximately 400 feet, a system operating in the 300 to 433 MHz band cannot match the range that DMP can achieve without a repeater.

Regulations also impact the supervisory signals that are critical to reliable operation of wireless alarm signals. These signals are sent from individual sensors to the alarm panel at regular intervals. If the panel doesn't receive a signal at the expected time, it generates an alert indicating that a sensor did not check in – either because the sensor is not operating properly or because it has been removed.

In the 300-433 MHz band, regulations prevent check-in signals from being sent more than once an hour, which means an intruder could remove a sensor and not be detected for nearly up to 24 hours. Wireless alarm systems operating in the 905-924 MHz band do not have this limitation, enabling sensors to be supervised as frequently as every three minutes.

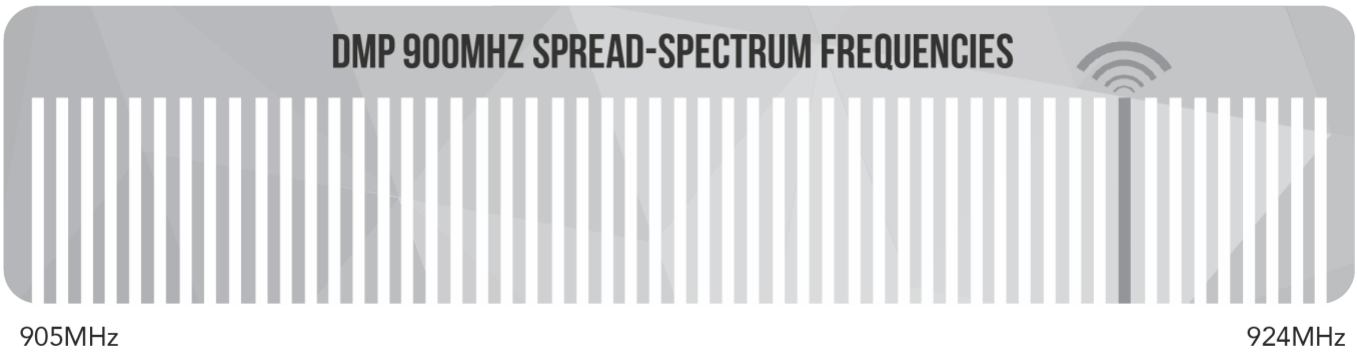


Spread spectrum

Another advantage of DMP Two-Way Wireless technology is that it uses spread-spectrum technology for more reliable transmission. This technology enables the system to use any of numerous channels within the 905-924 MHz band and to dynamically hop from frequency to frequency.

By using spread-spectrum technology, this virtually ensures that a DMP wireless system cannot be defeated by jamming. With non-spread spectrum systems that operate in a narrow frequency band, an intruder can use a wireless device to flood the area with transmissions at the same frequency used by the alarm system, thereby preventing alarm signals from reaching the receiver.

Every 32 milliseconds, DMP Two-Way Wireless hops to a new frequency across 53 frequencies. The order is determined by the house code of the panel.



Although spread-spectrum technology is designed to use frequencies other systems use, and it will see interference from other systems, it is designed to overcome that interference inherently. This is one of the main advantages of spread-spectrum wireless.

As the device and receiver are hopping to a different channel, when it encounters a channel that has interference on it, it simply moves on, and the data acknowledgement will not be received, thus requiring the panel or sensor to resend that signal. This trying and resending will automatically occur until the message is sent and acknowledged. This self-healing system is very reliable.

One-way versus two-way communications

Most wireless alarm systems use one-way communications. Individual sensors can transmit to the receiver. But the receiver cannot communicate with the sensors and therefore cannot communicate to the sensors that it has received the signals sent by the sensors. To compensate for this shortcoming, the sensors used in one-way alarm systems transmit alarm signals several times in the hopes the control panel will receive the signal at least once. But there is no confirmation that an alarm signal has been received. The multiple communications per sensor, called “round,” reduces battery life.

DMP two-way communication enables the control panel and sensors to exchange information. This allows the wireless devices to be controlled and adjusted remotely from the panel or Remote Link™ software. DMP Two-Way technology sends a single message and immediately receives a single acknowledgement signal allowing it to save much needed battery life.

For PIR motion sensors, the Two-Way technology can be used to adjust sensitivity and pulse count settings, etc. Additionally, the alarm panel can instruct the motion sensors to go to sleep but send supervision signals when the system is disarmed, saving battery life.

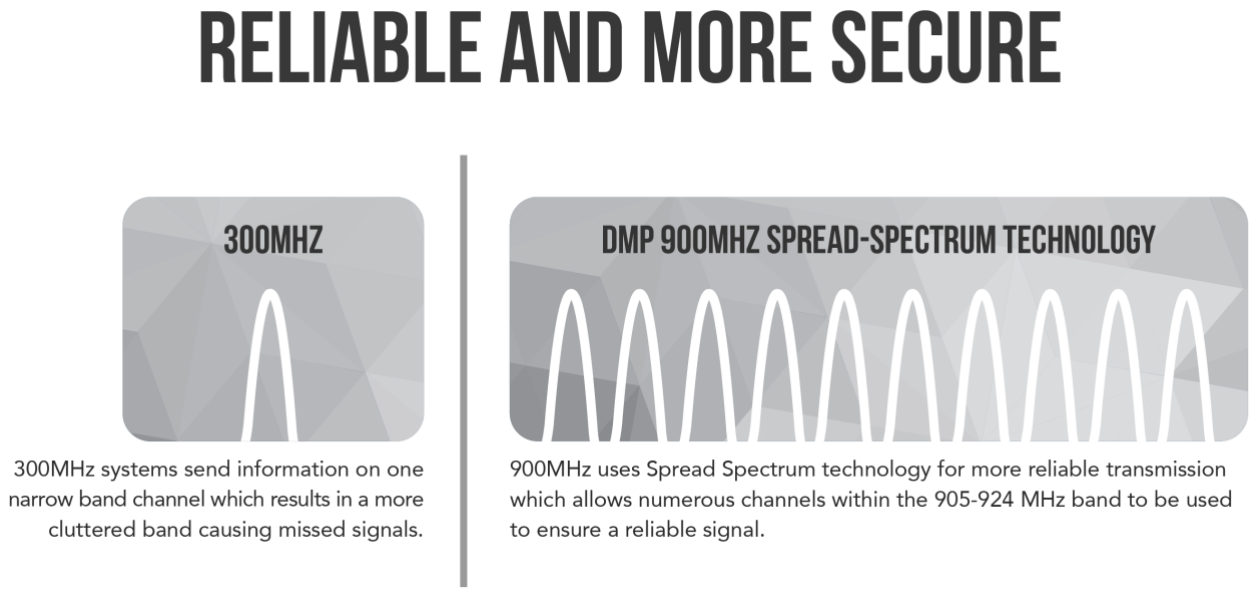
Some competitive PIRs go to sleep after being in an alarm condition for three minutes. But with DMP if the system is not programmed for swinger bypass, a sensor that is tripped repeatedly will continue to send an alarm signal with each trip. An example of where this would occur is when a PIR is repeatedly tripped by a person walking around in its field of view. This acts more like a wired PIR from the central station perspective providing operators with more real-time information to make appropriate decisions.

Advantages of the 900 MHz band

Operation in the 904-925 MHz band provides a number of advantages over equipment operating in the 300-433 MHz band. These advantages stem from the fact that radio wavelengths are shorter at higher frequencies. Wavelengths in the 904-925 MHz band are 70% shorter than radio wavelengths in the 300-433 MHz range.

Wireless signals do not penetrate metal objects. They will penetrate drywall, masonry, furniture, wall paneling and many solid objects, but the strength of signals passing through materials such as these is reduced. The advantage of shorter wavelengths is that they can more easily fit through narrow openings, while longer wavelength signals may be reduced in strength or, depending on the type of blockage, may not get through at all.

When wavelengths are blocked, they tend to bounce off the blockage and attempt to take another path. When this occurs, there is a greater likelihood with shorter wavelength-systems that a reflected wavelength will encounter an opening through which it can squeeze. This is less likely with longer wavelength systems because the reflected wavelengths, like the transmitted wavelengths, are longer than for 300-433 MHz systems and less likely to encounter an opening through which they can fit.



Commercial advantages

Alarm systems operating in the 300–433 MHz band typically aren't used for commercial applications for several reasons. One reason is the square footage of a typical business is considerably greater than for a typical residence, requiring sensors to be installed further from the receiver than 300-433 MHz systems can support with their limited range.

DMP 905-924 MHz wireless alarm systems have considerably more range, enabling them to easily achieve the coverage requirements of most commercial installations. For locations with high square footage, DMP can support as many as eight repeaters, each of which extends the distance sensors can be placed from the receiver by an additional 1,000 feet or more.

	900MHZ 2-WAY	300MHZ 1-WAY
Residential Burglary	Yes	Yes
Residential Fire	Yes	Yes
Commercial Fire	Yes	No
Relay outputs	Yes	No
Battery only sounders	Yes	No
Full LCD Keypad	Yes	No

Businesses tend to make frequent changes to their layouts — often adding walls or partitions where none existed before. This reality makes it impractical to use 300-433 MHz systems for commercial installations because those new obstacles may limit or hinder the systems' ability to work properly. Additionally, signals are weaker at the outer edges of a transmitter's coverage area — and because the range of a 300-433 MHz system is less than for a 905-924 MHz system, there is a greater likelihood that a new wall could reduce the signal strength of a 300-433 MHz system to the point where the transmission would not reach the receiver.

A third consideration is businesses may be required to have an alarm system that is UL approved for commercial fire. To get that approval, an alarm system must be able to support frequent sensor check-ins — typically every five minutes. And as noted previously, wireless alarm systems operating in the 300-433 MHz band are not allowed to transmit check-in signals so frequently.

DMP 905-924 MHz systems do not have that limitation, however. The wireless smoke detectors designed for use with the DMP system are UL-approved for commercial fire when used with the DMP wireless receiver (which also has UL commercial fire approval) and with a UL commercial fire-approved control panel.

Easier installation and maintenance

The sensors designed for use in the DMP Two-Way Wireless alarm system have a unique feature that makes DMP easier to install. Each DMP sensor has a built-in Survey LED. When the installer trips the sensor, the Survey LED turns on whenever data is sent to the receiver and immediately turns off when the receiver acknowledgment is received. Pressing the tamper switch is a convenient way to send data to the receiver to confirm operation — a capability made possible by the two-way communications strength of the system.

DMP's Two-Way Wireless system also has another capability that simplifies installation. By putting the system into "wireless check-in test," all sensors (except key fobs and transmitters programmed for a supervision time of zero) automatically check in. This lets installers easily determine if each sensor is communicating properly. And if the system is also put into walk test, PIRs can be easily walk tested for 30 minutes. When this is selected, the PIR LED flashes each time motion is detected.

Summary

DMP Two-Way Wireless alarm systems operating in the 905-924 MHz spectrum band offer numerous advantages over other products. These include:

- Longer range due to different regulatory requirements for the 905-924 MHz frequency band in comparison with the 300-433 MHz band
- Support for more frequent sensor check-ins, increasing system reliability
- Spread-spectrum technology for greater reliability and protection from jamming
- Two-way communications for greater reliability
- Suitable for commercial installations because of:
    - Greater range
    - Support for up to eight repeaters
    - Shorter wavelengths are less likely to be blocked by new walls or other changes made to a protected area
    - UL approved for commercial fire installations
- Easier installation and reduced installation costs due to two-way transmission and sensors with built-in survey LEDs
- Longer battery life for lower maintenance costs

Clearly DMP Two-Way Wireless alarm system is the right choice for alarm companies that want a competitive edge and want to offer customers the most reliable system that is easy to maintain.

FEATURES	900MHZ 2-WAY	300MHZ 1-WAY
Message acknowledgment	Yes	No
Frequency hopping	Yes	No
Anti-jamming	Yes	No
PIR trips	Multiple	Sleeps 3 mins after each trip
Adjust PIR over air pulse count	Yes	No
Adjust PIR sensitivity over the air	Yes	No
Arm/disarm wireless device with panel	Yes	No
Remote program wireless device	Yes	No
Walk test mode remotely over the air	Yes	No

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