

Application Note

Guide to installation of RADION Wireless devices

1. Introduction

This document describes useful information when installing the RADION wireless system. Certain factors must be considered such as range, materials, location of installation, and signal strength prior to the installation phase. Use this document to assist you in this process.

2. Principles

2.1 Distance/range

The RADION system range is reduced indoors due to walls, furniture, people, and other obstructions. As distance between the transmitter (the device) and receiver increases, the received signal level decreases.

2.2 Signal decrease per materials

2.2.1 Metal

Metals are capable of blocking radio waves very effectively.

2.2.2 Concrete, stone, and masonry

Dense materials are effective at reducing radio signals in proportion to the total thickness and mass through which the signal must pass to get to the receiver.

2.2.3 Wood, drywall, composites, plastics

Low density materials are more “transparent” to radio waves but can still reduce signals if there is enough material between the transmitter and receiver.

2.3 Reflections

In general, radio waves travel in straight lines, but in some cases, they can reflect off metal surfaces. This can result in either an improved or degraded signal at the receiver.

3. Placement of equipment

3.1 Transmitters (devices/points)

3.1.1 Install away from metal objects

Metal is a very effective shielding material, as well as degrading the efficiency of antennas if it is too close. Transmitters should be kept as far from metal objects as is practical. Enclosing a transmitter in a metal box, drawer, or cabinet will severely decrease the signal reaching the receiver.

3.1.2 Minimize areas of obstruction between transmitter and receiver

The path between the transmitter and receiver should be as clear of obstructions as is practical. In most installations, walls, furniture, and other obstructions are unavoidable, but the path from transmitter to receiver should be as clear as practical. In particular, any dense or metallic materials in the path should be avoided.

3.2 Receiver

3.2.1 Install away from obstructions

It is often convenient to place the RADION receiver near the control panel, but this is often not a good choice from a radio perspective. Often, there are concrete block walls, metal shelves, and other troublesome materials between the control panel and the transmitters. Additionally, the presence of cables and conduits behind and around the receiver can degrade the performance of the receiver antennas.

3.2.2 Install to close proximity of wireless devices

Install the receiver closer to all installed wireless devices so that there is minimal distance from the receiver to the wireless devices, which provides a shorter path and improves radio transmissions.

3.2.3 Install near low-power wireless devices

Some devices, such as small keyfob-style transmitters, have less radiated output power than larger devices, due to internal antenna considerations. These devices should be prioritized and the receiver positioned closer to them.

3.2.4 Install away from electrical equipment and electrical devices

Electrical equipment, electronic devices, light fixtures, printers, and many other devices produce electrical interference (noise). Install the receiver as far as is practical from other devices to avoid this interference. The receiver measures the noise in its environment between received messages and reports the difference between the received signals and this background noise. Excessive noise interference will degrade the ability of the receiver to receive messages from the devices. In extreme cases of noise or other interference, the receiver will issue a “jamming” alarm to indicate that it is experiencing extreme interference.

3.3 Repeaters

3.3.1 Provide an alternate or redundant path between transmitters and receiver

Repeaters are devices that re-transmit any valid RADION message they receive from a point to the receiver. They can be used to establish a redundant path for the transmissions to increase reliability.

3.3.2 Placement

Since the repeater is a receiver combined with a transmitter, placement considerations for both receivers and transmitters apply.

3.3.3 Use as a range extender

Repeaters can be used to extend the range of transmitters and help distant points to communicate with the receiver. In this application, the repeater should be placed between the transmitter(s) and the receiver.

3.3.4 Use as an aggregator for low-power devices

Repeaters can be used near low-power transmitters to provide a more reliable link back to the receiver. In this usage, the repeater should be located near the middle of the group of points and with a clear path back to the receiver.

3.3.5 Up to 8 repeaters in a system

RADION systems may not have more than 8 repeaters in a system to avoid message loss. The repeaters keep track of how many times a message has been retransmitted. After 8 retransmissions, they no longer retransmit the message.

4. Making sense of Signal and Margin information

4.1 Signal

The Signal value reported is scaled 0-99, and is a measure of the strength of the message from a given point when it reaches the receiver. If a repeater is involved, it is the strength of the message to the first repeater. If the message arrives directly at the receiver and through a repeater, whichever value is higher is reported. A higher value is desired.

4.2 Noise

The receiver measures the ambient radio interference or noise in the environment when it is not receiving messages. The noise is not directly reported, but is used to calculate Margin.

4.3 Margin

Margin is the difference between the measured Signal and the measured Noise values. In technical terms, this is the “signal to noise ratio (SNR)”, and is an indication of how much stronger the signal is than the environmental noise. As noise increases, the Margin value decreases.

4.4 RPS signal and margin

Signal and Margin are reported for the convenience of the installer to ensure a reliable installation. When both Signal and Margin are high, the messages have the best probability of reception. If Signal is high, but Margin is low, there is a noise interference issue. If Signal is low, there is an issue with the radio signal getting from the transmitter to the receiver.

Note: Make sure that you see a Signal strength of at least 60 and a Margin of at least 40. Both conditions must be met for RPS to indicate that the installation is good.

The signal value is updated when the point transmits or when the supervision message is sent. Different devices have different supervision time and signal strength.

Product line	-A variant	Non -A variant
Supervision time	65 min	13 min
Supervision signal strength	50%	100%

Therefore, depending on the device used you may see it read good during an activation and weak during the supervision check-in.

This 50% supervision check-in level ensures that if you have no missing points or troubles that during the actual activation the signal will be received by the system.

If you are using RPS to doublecheck your values and you are making changes to placement, then you must be sure the device has been activated after your change to see the new signal and margin level.

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