



Tech note

Inovonics Device Installation Recommendations



Introduction

The purpose of this document is to provide recommendations for the installation of the RF gateways, repeaters and transmitters that make up an Inovonics EchoStream system. The recommendations described here will afford the best chance of setting up a secure and reliable system.

Caution: Always follow electrical code requirements specific to your area, and before undertaking any electrical project, contact your local electrical authority and your insurance company to ensure that you comply with all policies, warranties, regulations and authorities having jurisdiction concerning this work.

RF Signal Propagation Considerations

Line of sight between devices is achieved when you can see the repeater or receiver from the transmitting device.

While wood, drywall and glass usually let the RF signals pass, some materials may inhibit or attenuate radio frequency (RF) signal propagation by blocking, reflecting, deflecting or absorbing RF signals.

Consider anything between transmitters and repeaters and/or the receiver. Is there concrete and steel construction? Are there earthen berms or hills? Are there a lot of trees? Devices should be mounted such that they are least affected by these elements.

For best results, transmitters and repeaters should be mounted at the optimal height to achieve line of sight to other repeaters and/or the receiver. Usually this means they will be mounted as high as possible.

Following are some typical obstacles to RF signal propagation:

Material	Affect	Recommendation
Metal construction, including ductwork; pipes; studs; stucco, plaster or concrete with wire mesh; satellite dishes, metal-lined rooms such as walk-in coolers or freezers; metal siding, safes, etc.	Can reflect, absorb and/or disrupt RF signals.	Perform a site survey using an Inovonics wireless survey kit to verify the RF signal is acceptable, and, when necessary, to determine where to locate repeaters.
Completely enclosed metal boxes/enclosures.	Can restrict RF signals.	
Solar panels, cinder block walls, windows with built-in solar tinting.	Can absorb and/or reflect RF signals.	

Material	Affect	Recommendation
Vegetation.	Can attenuate RF signals. The RF environment can alter as trees shed or sprout leaves.	Add repeaters as issues arise.
Automobile and truck traffic.	Can disrupt RF signals.	Mount Inovonics devices at a height sufficient to achieve line of sight above traffic.

Environmental Considerations

Always ensure that Inovonics devices are installed in environments that meet the specifications listed in the installation instructions.

Before installing any device, inspect the installation location, considering these factors:

- **Temperature:** Inovonics devices must never be installed in an environment where the temperature is outside of the range specified in the installation instructions. Be careful that the temperature does not fluctuate dramatically throughout the year. For instance, an attic that falls within the accepted temperature range during the fall, may experience dramatically increased temperatures in the summer.
- **Battery life:** Inovonics devices use lithium ion batteries, which are susceptible to temperature extremes. Even when Inovonics devices are mounted in locations within the specified temperature range, you should be aware that the temperatures at the lower and upper limits can degrade battery life. The longest battery life will occur between 70° to 90°F.
- **Humidity:** The transmitters must be installed in a non-condensing environment. Watch for condensation above the mounting location. In humid environments, cold water pipes, air exchange units and air conditioners will sweat and drops of water will fall to the floor. Humidity will change over the course of the year.
- **Double-sided tape:** In certain environments tape is not as reliable as using mounting screws. Adhesives can lose effectiveness over time, especially in hot environments, and the device can fall into a place that prevents RF signal propagation. If tape is used, make sure the mounting surface is clean and dry, and check the tape on a regular basis.
- **Leaks and flooding:** Do not mount the device on or under anything with potential to drip water. If the location where the device will be installed has the potential for flooding (such as a basement apartment, in the same room as a water heater, etc.), mount the transmitter high enough to avoid the water.
- **High traffic areas:** Robustly mount the device in a location where it will not be tampered with, bumped or knocked off the wall or ceiling.

Recommended for RF Gateway Installation

All Inovonics devices should be mounted in locations where they are at least two feet removed from other electrical equipment.

There are several kinds of Inovonics RF gateways: the network coordinator, the serial receiver, the add-on receiver, the IP receiver and the remote data logger. Following are installation recommendations for all RF gateways:

- Always adhere to the power and cabling specifications in the installation instructions. Never use a transformer with specifications that do not meet Inovonics technical specifications.
- To avoid interference, RF gateways should be mounted in a location at least two feet removed from other electrical equipment.
- Mount the RF gateway within the specified distance from an appropriate power source.
- Transformers are heavy and can drop out of an electrical socket. They should be secured.
- To prevent hardware damage, never power the transformer unless the RF gateway is connected.
- To avoid power interruptions, outlets powering inside-mounted RF gateways should not be a GFCI circuit.
- Never power multiple Inovonics devices from the same transformer.

Recommended for Repeater Installation

Following are installation recommendations for Inovonics repeaters:

- Always adhere to the power and cabling specifications in the installation instructions. Never use a transformer with specifications that do not meet Inovonics technical specifications.
- To avoid interference, repeaters should be mounted in a location at least two feet removed from other electrical equipment.
- Mount the repeater within the specified distance from an appropriate power source.
- Transformers are heavy and can pull themselves out of an electrical socket. They should be secured.
- It is best not to mount repeaters in a high traffic area where the transformer can be knocked loose, or unplugged for other use of the outlet.
- To prevent hardware damage, never power the transformer unless the repeater is connected.
- To avoid power interruptions, outlets powering inside-mounted repeaters should not be a GFCI circuit.
- If possible, it may be preferable to install outlets just for the repeaters in non-accessible places.

- To provide the clearest path possible for wireless transmission, repeaters should be mounted with as few obstacles as possible between them and the RF gateway.
- The location of all repeaters should be documented for future maintenance. There are a number of ways to do this. Pictures can be taken of the location of each repeater, the location can be noted in a notebook, or even marked on a floor diagram to create an installation map.
- Never power multiple Inovonics devices from the same transformer.

Suggested Repeater Locations

Note: Extreme ambient temperature and humidity may result in exceeding the device's rated operating temperature and humidity limits.

- Under roof overhangs.
- Breezeways.
- Attics, as long as they are environmentally controlled such that the temperature will not exceed specifications.
- Common grounds closets.
- Outdoor repeater installations require a weather-resistant enclosure, such as the Inovonics ACC650 outdoor plastic enclosure, or another NEMA 4 rated, non-metallic enclosure.

Never mount an Inovonics repeater in a metal enclosure.

Recommended for Transmitter Installation

Following are installation recommendations for Inovonics transmitters:

- If transmitters are registered before installation, the right transmitter must be installed in the right location. Label the transmitters or write the location directly on the housing using a permanent marker.
- The location of all transmitters should be documented for future maintenance. There are a number of ways to do so. Pictures can be taken of the location of each transmitter, the location can be noted in a notebook, or even marked on a floor diagram to create an installation map.

Conclusion

Though there are numerous obstacles and environmental factors to consider when installing an Inovonics system, most of these can be mitigated by using Inovonics high power repeaters, which intelligently amplify transmissions from Inovonics transmitters. When RF signals are inhibited or attenuated, high power repeaters can be added to overcome the obstacles or environmental factors causing the disruption. To aid in the placement of high-power repeaters, Inovonics strongly recommends performing a site survey using an Inovonics site survey kit.

The purpose of this document was to provide recommendations for the installation of the Inovonics devices that make up an Inovonics EchoStream system. For more questions about Inovonics installations, contact Inovonics Wireless technical services:

- E-mail: support@inovonics.com.
- Phone: (800) 782-2709; (303) 939-9336.