# Using Bluetooth and Zigbee with the iManifold

**Overview**

There are two radios in the iManifold, Bluetooth and Zigbee. Bluetooth is a short range non-repeatable radio signal. The power of the transmitter cannot be increased. We use a very high output Bluetooth radio, the range is about 400 feet within line of sight however it is easily diminished through bulding material. If you lose connections there are some workarounds. For instance, if you are working on a residential air conditioner and you lose Bluetooth signal when you take your phone or tablet into the house, try reconnecting when you are where you want to work (by the furnace, in the basement, attic etc). You may have lost the signal walking around the house to the door, and may be closer to the manifold at the interior work area and may be able to reconnect there. It is not intended for long range use as it simply will not work for that. We intended the technician to be standing close to the manifold and the wireless probes to send the data to the iManifold. That is the job of the Zigbee radio probe.

**Bluetooth Operation**

In order to maximize the range of Bluetooth you need to make sure that you are doing the following:

1) **Do not hang the iManifold against a solid metal panel**, hang it in free air, typically off the electrical disconnect is a good place.
2) **Hang the manifold on the side of the unit that you want to transmit to.** If you hang it on the opposite side that you are transmitting to it has to transmit through the unit. This cuts down range
3) **Do not set the unit on the ground**, you will be transmitting a lot of the signal into the earth cutting the transmission distance in ½
4) **Handle the tablet/smart device with care.** Position of the iPad (tablet) and setting it down on a metal panel or on the floor will compromise the tablets ability to receive. The iPad and the Manifold work as a system, handling and placement of one is just important as the other when you desire to transmit long distances.

**If you do disconnect, all you have to do is reconnect once you are back in proximity.** Also you do not have to be connected to the iManifold in order to continue to add data to the application. For instance if you went inside to get blower amps, and you lost connection. You could still put the information into the application and it would be there when you reconnected when you were back in range. You can set the auto off to a higher timeout in the configuration menu if you are going to be disconnected for more than 10 minutes.

**Zigbee Operation**

Now to the Zigbee, Zigbee also has a 400' plus range, but has much better penetration through typical building materials then Bluetooth. Because the way that Zigbee works, the range can be easily be extended even up to miles away by adding probes to the network. It is the most common type or radio used in building automation networks and wireless thermostats in the HVAC industry. Zigbee is very robust, as it forms a mesh network. This means that probes can talk to probes or directly to the iManifold. The more probes that you are using in a network the more reliable the network will be as it can establish multiple and alternate paths.  When you first set up the probes, it may take them a minute or so to establish the route back to the iManifold, as the current path might not be optimal, and a new path is being established. The network is called "self-healing". This is a very cool feature of Zigbee as all you have to do if you need to transmit a long distance is to add a repeater probe to the network and the path will establish and go back to the network.

**Maximizing Zigbee Range:**

To get the most range out of Zigbee the following is recommended:

1) **Initially, add probes to the network in the vicinity of the iManifold**. The iManifold is the network coordinator and needs to establish what probes are on the network.
2) **Remove any probes that are not going to be used in the network by removing them in the probe management screen**. Probes that are not "on" will constantly be looked for by the network as it wants to "self-heal" this ties up network resources.
3) **Allow the network a few minutes to establish a path when it is first set up.** The probes need to configure a path back to the manifold. Interrupting the process or trying to do it manually by removing and adding probes will take longer than waiting a minute or so for it to reconfigure. Once it configures it will be solid.
4) If you are **transmitting long distances or in areas of high interference, adding a repeater might be required or helpful**.
5) If you are using the probe in a freezer or placing it in the return duct, (in a metal enclosure) the range will be cut back significantly. To get the signal back to the manifold, either have another probe in the vicinity that is not totally enclosed in a metal enclosure, or place a repeater outside the enclosure to extend the signal back to the manifold. This is probe to probe communication.
6) If you can see one probe on the iManifold, and the other is in close vicinity but cutting in and out, it simply needs a minute or so to reestablish the network. Give it a minute or so.
7) Remember that when you start probes next to the iManifold, they are likely talking directly to the manifold. When you move them to the measurement location, they may need to establish a new route back to the manifold, so they could be hit/miss for a minute or so until the path is reestablished.