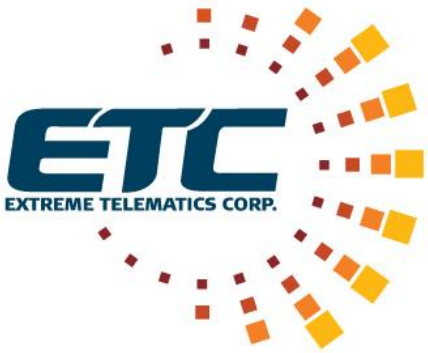
Application Note - Iris Wireless System

Antenna Mounting and RF Interference Mitigation



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Revision History

Revision	Date	Author	Changes
1	22 June 2016	Valens D'Silva	I

Acronyms

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1 Introduction

1.1 Purpose

Iris Wireless System (Iris) is a cost-effective, easy to use wire replacement system that safely enables a variety of devices to be powered and have their signal measurements relayed back to a gateway up to ½ mile away.

1.2 Overview

Good radio reception depends on several factors including antenna/system mounting and interference from outside/other RF sources. This application note will explain how to mount the Iris Wireless System in order to obtain the best possible reception and ways to mitigate interference from other radio sources.

2 Antenna Placement

The rules for antenna placement are simple (in theory) but often difficult to deploy in the field. It is recommended to try to do the best you can for each of the suggested rules below and everything will likely work well.

The following rules should be followed as closely as possible:

- Height from the ground – The higher (within reason) the better. It is recommended to get the antenna off the ground at least 3 feet. Above 10 feet, there are diminishing returns unless there is something in the way you are trying to get over.
- Proximity to Metal Objects – Try and keep the antenna away (from the side) from piping, conduit, or any metal object (at least 8”), further is better.
- Other Antennas – Try and mount the antenna/module out of the way of other antennas.
- Line of Sight – Try and mount the unit so it has the best possible link to the Iris gateway

3 Interference

The Iris Wireless System only communicates when necessary. It does not transmit continually in order to preserve bandwidth for other systems. Unfortunately, some other radio systems do not perform like this and can transmit continually. There are several clues as to whether this will be a problem or not.

3.1 Practical Interference Rules

- Yagi antennas, from other wireless devices, generally mean slave or remote radios and these do not transmit continually and usually do not create an interference issue as Iris devices will retry the message until it receives confirmation that the message was received. These are most commonly seen in the field near Iris devices
- Omni-directional antennas may have base-station radios attached and may pose an issue for interference. Most field antennas are not base-station radios
- Keep Iris devices out of the plane of both types of antennas and directly above or below them if possible
- If an Iris device must be located close to an always-transmitting base station radio, frequency banding (having the base station transmit on one set of frequencies and the Iris device transmit on a different set) can help. See section 3.2 for more information

Most Yagi antennae are connected to remote or slave radios that do not transmit very often. This is similar operation to any Iris device. Iris devices are very “frequency band friendly” and do not use up (in time) much bandwidth.

3.2 Base Station Radio Interference

Some base-station or repeating radios will transmit at all times. These systems will often frequency hop over the entire band making communications difficult. The result of interference is greatly reduced range from the gateway to remote nodes. If you suspect an interference problem, contact Extreme Telematics for assistance.

All Iris devices, including the gateway, only transmit in short bursts infrequently. Consequently, Iris equipment usually does not pose an interference risk for other radio systems.

There are several ways to mitigate interference:

- Antenna Separation
- Frequency Separation

3.2.1 Antenna Separation

Antenna separation is simply making sure that the antenna (usually the gateway) is not in close proximity to the interfering antenna. For a high power base-station radio (like a GE MDS or Freewave radio), physical separation of 100 feet laterally is required or 10-20 feet vertically (this is often easier). Most GE for Freewave radios at a well site are NOT base-station radios.

3.2.2 Frequency Separation

One method for reducing interference is to have the radio systems not use the same frequency band. The 915 MHz spectrum covers frequencies from 902 to 928 MHz and, often, a base station radio can be configured to use a portion of the band that Iris devices are not using.

The table below indicates the GE MDS frequency zones to block to minimize frequency overlap with the Iris device. Note that the zones to block depend on the radio network and radio group setting set in the Iris device.

Iris Wireless System		MDS		Iris Wireless System		MDS
Network	Group	Zones to Block		Network	Group	Zones to
0	0	2,3,4,5		0	4	2,3,4,5
1	0	3,4,5,6		1	4	2,3,4,5
2	0	3,4,5,6		2	4	3,4,5,6
3	0	3,4,5,6		3	4	3,4,5,6
4	0	3,4,5,6		4	4	3,4,5,6
5	0	3,4,5,6		5	4	3,4,5,6
6	0	3,4,5,6		6	4	3,4,5,6
7	0	3,4,5,6		7	4	3,4,5,6
0	1	3,4,5,6		0	5	3,4,5,6

Iris Wireless System		MDS		Iris Wireless System		MDS
Network	Group	Zones to Block		Network	Group	Zones to
1	1	3,4,5,6		1	5	3,4,5,6
2	1	3,4,5,6		2	5	3,4,5,6
3	1	3,4,5,6		3	5	3,4,5,6
4	1	3,4,5,6		4	5	3,4,5,6
5	1	3,4,5,6		5	5	3,4,5,6
6	1	3,4,5,6		6	5	3,4,5,6
7	1	3,4,5,6		7	5	3,4,5,6
0	2	1,2,3,4		0	6	1,2,3,4
1	2	2,3,4,5		1	6	2,3,4,5
2	2	2,3,4,5		2	6	2,3,4,5
3	2	2,3,4,5		3	6	2,3,4,5
4	2	2,3,4,5		4	6	2,3,4,5
5	2	2,3,4,5		5	6	2,3,4,5
6	2	2,3,4,5		6	6	2,3,4,5
7	2	2,3,4,5		7	6	2,3,4,5
0	3	2,3,4,5		0	7	2,3,4,5
1	3	2,3,4,5		1	7	2,3,4,5
2	3	2,3,4,5		2	7	2,3,4,5
3	3	2,3,4,5		3	7	2,3,4,5
4	3	2,3,4,5		4	7	2,3,4,5
5	3	2,3,4,5		5	7	2,3,4,5
6	3	2,3,4,5		6	7	2,3,4,5
7	3	2,3,4,5		7	7	2,3,4,5

Table 1 - Iris and GE MDS Frequency Separation