

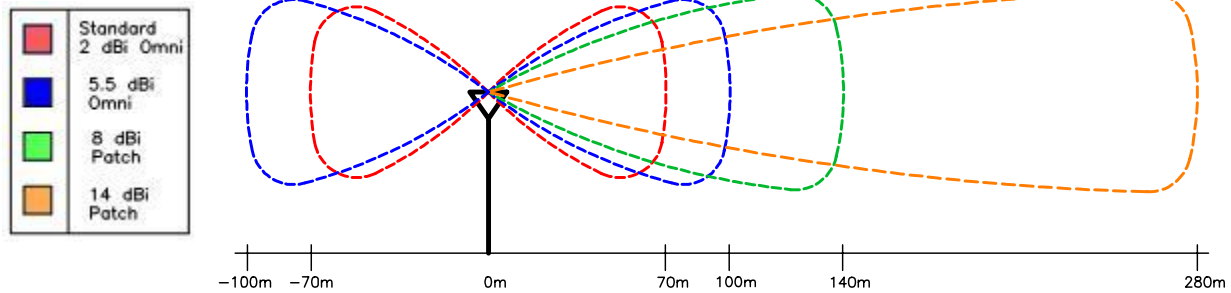
## 2.4 GHz Wireless Nodes



### Maximizing Wireless Communication Range

#### Overview

This document is intended to help achieve maximum range with your MicroStrain wireless sensor product. MicroStrain offers 3 optional range extending antennas for use with the 2.4 GHz V-Link®, G-Link®, SG-Link®, TC-Link®, Inertia-Link® and 3DM-GX2® wireless sensor products. The same range extending antennas can also be used with the MicroStrain 2.4 GHz USB Base Station, Analog Base Station, and Serial Base Station. These antennas are capable of providing a 150% to 400% range improvement over the standard 2.2 dBi antenna that ships with each product. The following figure illustrates a range comparison for the four different antennas, assuming line-of-sight conditions and an antenna mount 2 meters (6 feet) above ground. Note the difference between the omni-directional antenna behavior and the unidirectional behavior of the patch antennas.



## Maximizing Wireless Communication Range

### Range Extending Antennas



#### **MD-ANT-2400-OMNI**

- MD-ANT-2400-OMNI is a 5.5 dBi, omni directional vertical antenna with reverse-polarity SMA plug connector.
- The antenna is connected directly to the base station or node antenna connector.
- A data sheet can be found at: <http://www.l-com.com/item.aspx?id=22353>
- This antenna is useful when extending the range between one base station and many nodes (point-to-multipoint), or any application with mobile nodes.



#### **MD-ANT-2400-UNI-8dBi**

- MD-ANT-2400-UNI-8dBi is an 8 dBi, unidirectional flat patch antenna with reverse-polarity SMA connector.
- The antenna is connected to the base station or node antenna connector by way of a 4 foot cable extending from the antenna body.
- A data sheet can be found at: <http://www.l-com.com/item.aspx?id=22304>
- This antenna is useful for maximizing the range between a base station and a node (point-to-point).



#### **MD-ANT-2400-UNI-14dBi**

- MD-ANT-2400-UNI-14dBi is a 14 dBi, unidirectional flat patch antenna with reverse-polarity SMA connector.
- The antenna is connected to the base station or node antenna connector by way of a 4 foot cable extending from the antenna body.
- A data sheet can be found at: <http://www.l-com.com/item.aspx?id=23179>
- This antenna is useful for maximizing the range between a base station and a node (point-to-point).

## Maximizing Wireless Communication Range



### Additional Tips for Improving Range

#### Antenna Orientation

- Try to maintain identical antenna polarization/orientation. When using the standard omni-directional antennas that ship with the nodes and base, try to keep all antennas pointed toward the sky.
- Avoid pointing node antennas directly at base station, or base station antennas directly at nodes. Omni-directional antennas exhibit strong nulls in that axis.
- For high-gain patch antennas, point the front face of the patch directly at the intended target. When using multiple patch antennas, mount each patch so that the relative orientation of the antenna cable is identical. This will ensure identical antenna polarization and maximum range.

#### Line of Sight

- If possible, place nodes within line of sight of the base station.
- Glass does not cause significant signal attenuation (~1 dB loss), with the exception of metal reinforced security glass.
- Liquid mediums (water, foliage, snow) cause significant attenuation.
- If node must be completely enclosed within metal, try to find a way to route antenna outside the enclosure.

#### Maximum Height

- Place both node and base station antennas as high as possible for maximum range.
- If at all possible, do not place the node or base station directly on the ground.

#### Electromagnetic Fields

- If possible, try to keep antennas away from potential sources of EMI and wireless interference such as WiFi access points, microwave ovens, CRT monitors, etc.