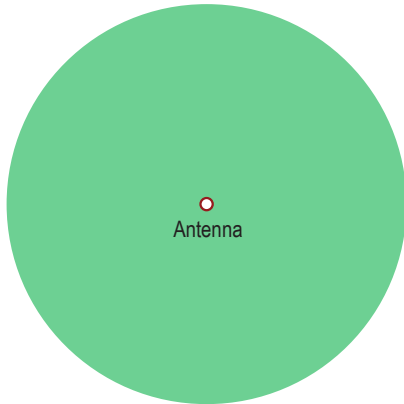


## Theory and Terminology

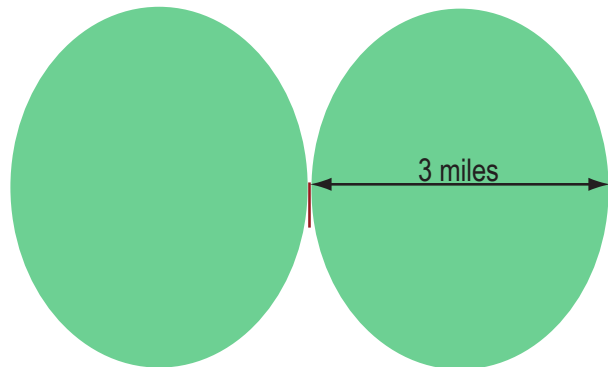
### Omni-Directional Antennas

Omni-directional antennas mount vertically and transmit and receive equally in all directions within the horizontal plane. Omni-directional antennas are used with the Sure Cross® Gateway, because the Gateway is usually at the center of the star topology radio network.

An omni-directional, or omni, antenna transmits and receives radio signals in the 'doughnut' pattern shown. Note the lack of a signal very close to the antenna. Most dipole omni antennas have a minimum distance for optimum signal reception.



From the top view, the signal radiates equally in all directions from the antenna. For this reason, omni-directional antennas are best used for the device in the center of a star topology network.

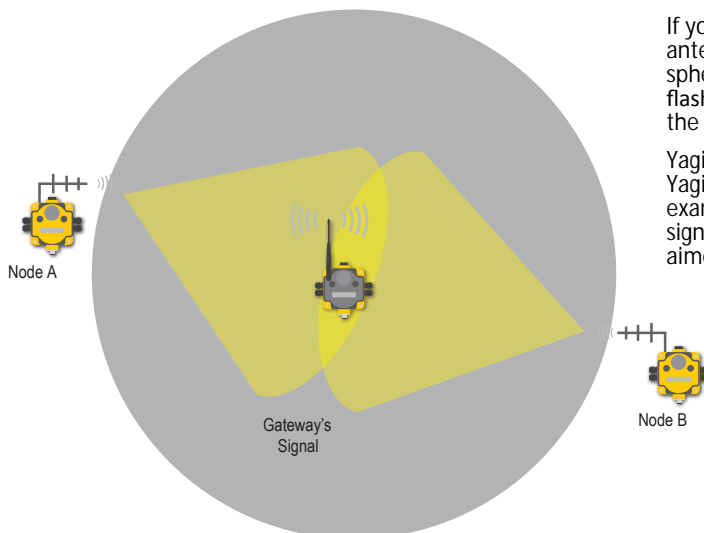


Viewed from the side, however, the radiation pattern of an omni-directional antenna is doughnut shaped.

With the star topology network, using an omni-directional antenna on the Gateway that ensures all Nodes fall within the antenna radiation pattern.

### Directional Antennas

A directional (Yagi) antenna focuses the radio signal in one specific direction.



If you compare antenna radiation patterns to light, an omni antenna radiates a radio signal like a light bulb — evenly in a spherical pattern. A directional antenna radiates similar to a flashlight — focusing the signal only in one direction. The higher the gain, the more focused the beam becomes.

Yagi antennas are best used in line-of-sight radio systems because Yagis focus the radio signal in a specific direction. In the following example, the Gateway uses an omni antenna to receive radio signals from multiple directions but the Nodes use Yagi antennas aimed directly at the Gateway to send and receive the radio signal.