

The standard antennas provided with Buckeye Cam wireless devices are small omnidirectional antennas that attach directly to the device. The type of wireless transmission used is radio frequency (RF) line-of-sight. Generally speaking, this means that you need to have a limited amount of obstructions between the transmitting and receiving devices in order to get an acceptable transmission signal.

Standard antennas WILL transmit through:

- Most types of trees
- Wood frame walls

Standard antennas WILL NOT transmit through:

- Thick pine trees ( conifers )
- Metal buildings or structures
- Earth or large hills

For many applications, the standard antennas will work well. For applications where obstructions are present in the transmission path or the transmission distance needs to be increased, two options are available: repeaters and high gain antennas.

## Repeaters

Figure 1 shows an example setup using repeaters. In this example, only camera 1 has an unobstructed line-of-sight to the receiving base. Camera 3 and camera 1 are used as repeaters. Camera 4 is routed through camera 3. Camera 3 and camera 2 are routed through camera 1. Camera 1 receives all of the pictures and transmits them to the base.

Note in the example of Figure 1, all of the devices are cameras, however any of the Buckeye Cam wireless devices may be used as repeaters. The only limitation is that all of the devices in the network must be of the same product type. For example, Orion cameras can only communicate with Orion cameras and X80 devices can only communicate with X80 devices. Consult the user's manual of your particular device for instructions on how to set it up as a repeater.

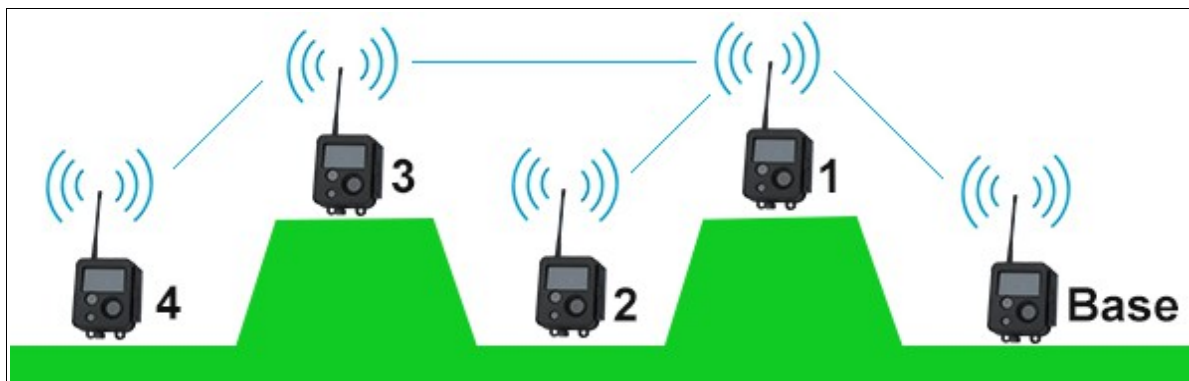


Figure 1. Example of a repeater setup.

Using devices as repeaters can cause transmission delays and reduced battery life. In the example shown in Figure 1, there will be some additional transmission delay as the pictures must pass through intermediate cameras before arriving at the base. Also, the battery life of cameras 3 and 1 will be somewhat reduced due to the extra burden of transmitting pictures from other cameras.

In many cases the additional transmission delay may be insignificant. Also, battery life may be improved with optional solar panels. However, it is preferable to route each device directly to the base whenever possible.

## High Gain Antennas

High gain antennas may be necessary in situations where many obstructions are present in the transmission path, or when it is necessary to significantly extend the transmission distance. Two types of high gain antennas are available: omnidirectional and directional (Yagi).

### *High Gain Omnidirectional Antennas*

- Radiate equally in all directions. Good for devices that act as repeaters.
- Long cables may be used to mount the antenna high enough to avoid obstructions.

### *High Gain Directional Antennas (Yagi)*

- The highest gain (best signal) can be achieved with these antennas.
- The antenna must be pointed in the direction of the receiving device.
- Long cables may be used to mount the antenna high enough to avoid obstructions.

For areas where it is difficult to get a good signal, a high gain directional antenna (Yagi) is generally the best choice. The only limitation with directional antennas is that they are not suitable for devices used as repeaters. This is due to the fact that they must be pointed in the direction of the device they will be communicating with. A repeater must communicate with more than one device, therefore a directional antenna is not a good choice for a device that will be used as a repeater.



Figure 2. Directional (Yagi) Antenna



Figure 3. Omnidirectional Antenna

The directional antenna must be mounted so that the main beam of the antenna is parallel to the ground and pointed in the direction of the transmitting/receiving device (see Figure 2). The omnidirectional antenna should be mounted perpendicular to the ground (see Figure 1).

## Summary

The intent of this application note is to describe the different optional antenna setups that are available for all Buckeye Cam wireless devices. For many applications, the standard omnidirectional antennas that are supplied with your device may be all that is required. The standard antennas typically will work well in situations where the transmission distance is one mile or less and there are few obstructions. In cases where many obstructions are present, or the transmission distance needs to be increased to several miles, optional high gain antennas are usually required.

If you would like assistance in selecting the right antenna for your application, contact Buckeye Cam by phone or email. Usually we are able to make an antenna selection for you if you can give us the GPS coordinates of the locations where your devices will be installed.