

# CYPRESS

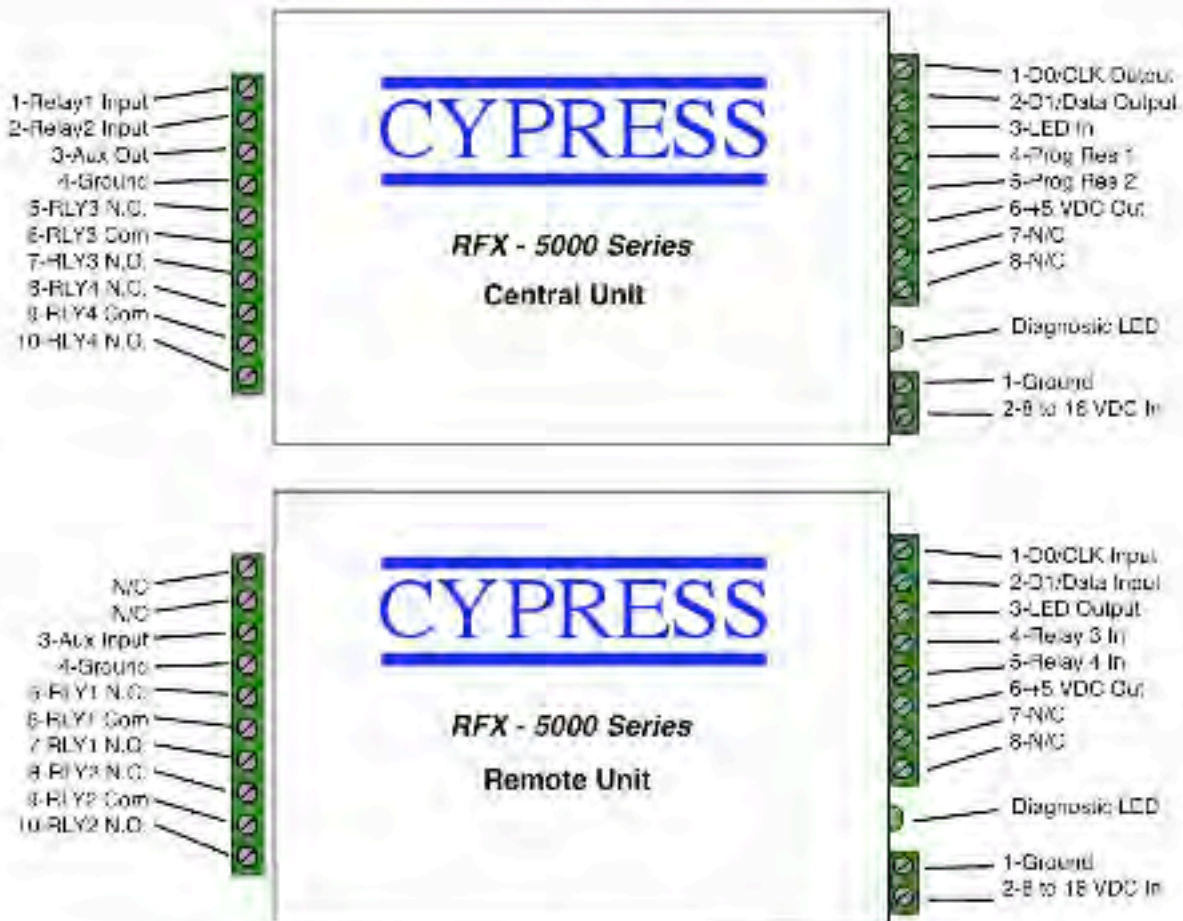
## Suprex 5500 Series

**RF**

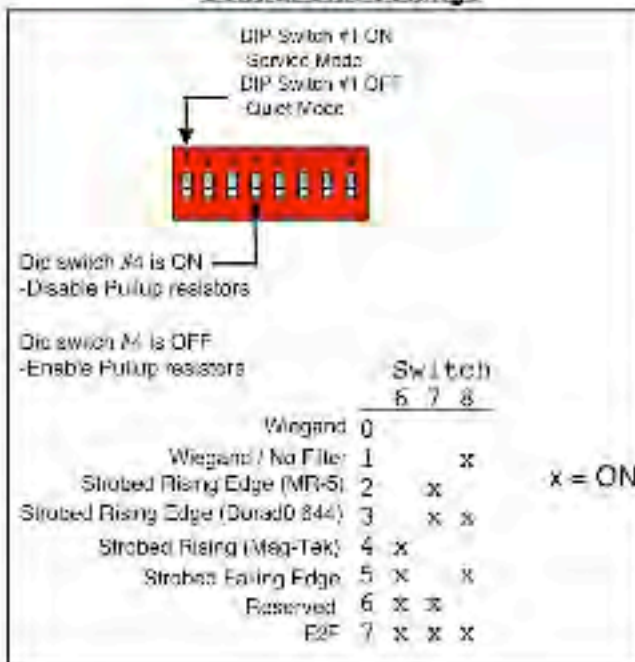
### Suprex RF - Site Evaluation and Product Selection Guide



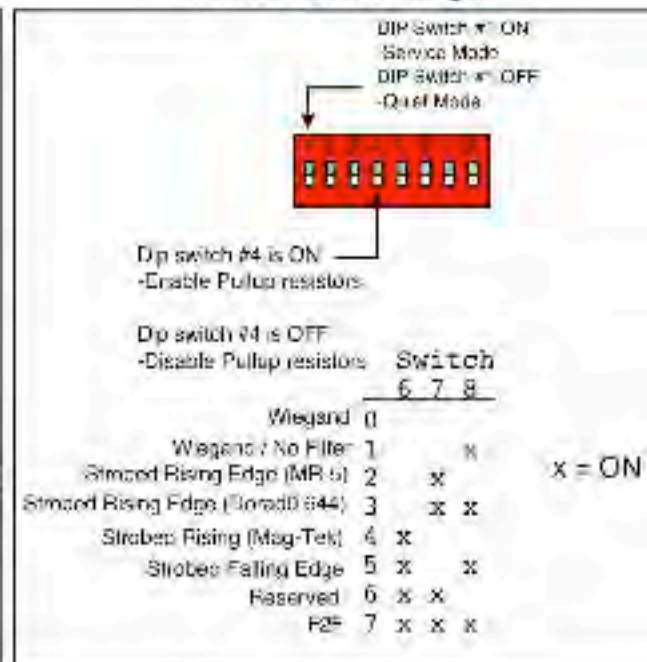
## External connections and DIP Switch Settings



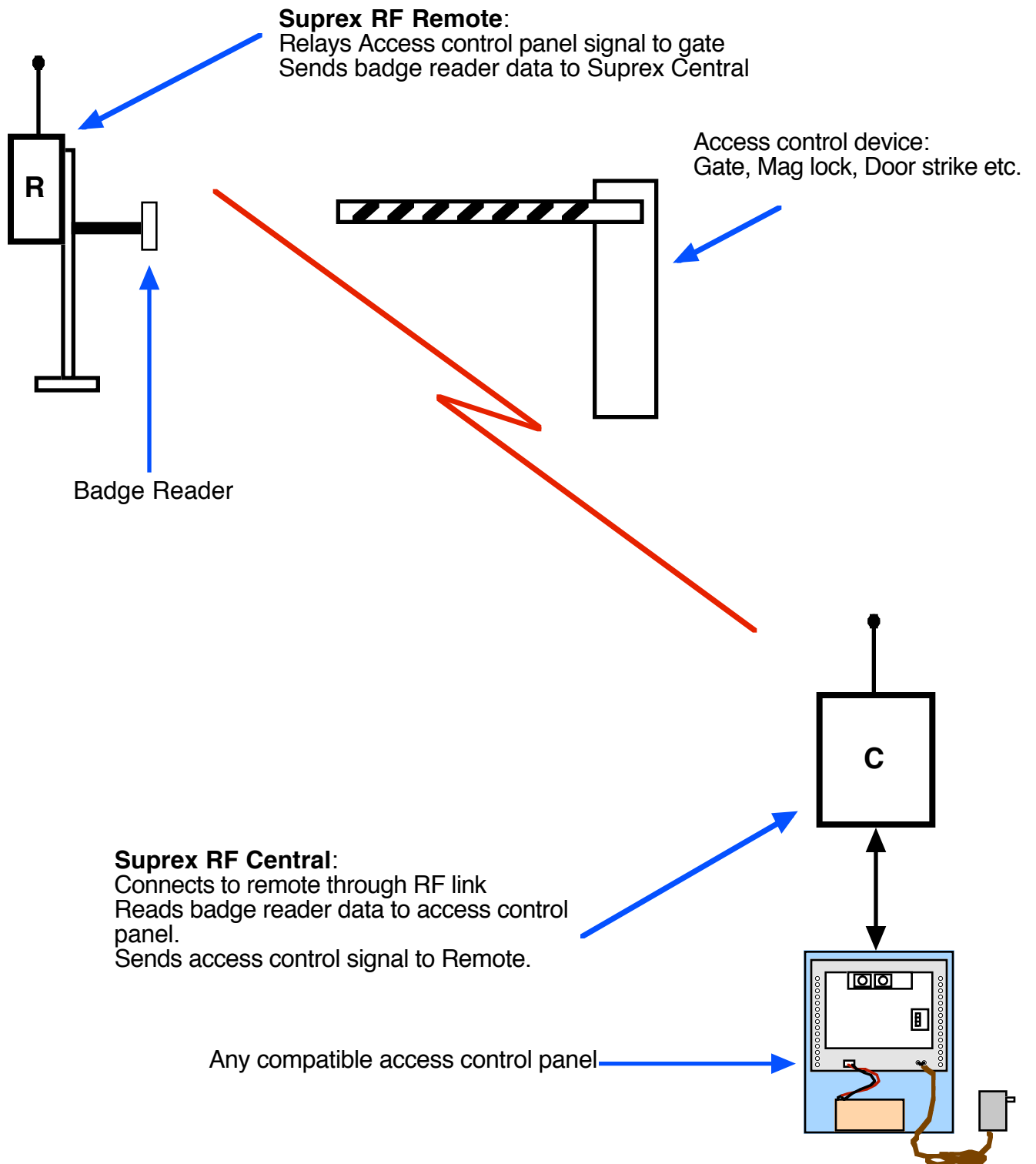
### Central Unit Settings



### Remote Unit Settings



# Typical Application Example:



The Cypress Suprex RF is the newest member of the Suprex family of products.

The Suprex RF 5500 series supports a wide range of additional features from previous versions of the Suprex RF family.

Additional features:

- Units are matched at the factory, No channel selection is required
- DES56 Encryption for secure communications
- Diagnostic mode for setup and configuration
- “Quiet” RF protocol to conserve bandwidth and power
- Field configurable reader formats
- Additional indicators for determining operational status of the unit

Initial setup and configuration.

The Suprex RF unit operates as a matched pair of units that share the same communication channel.

Each unit functions as transceiver and can both the Central and Remote can transmit and receive radio signals.

The pair consists of a “Central” unit and a “Remote” unit. The two units carry signals back and forth between an access control panel and reader. Associated control signals are also relayed between the two units. The Central unit connects to the access control panel and provides the reader data to the panel as well as sending and receiving status signals between panel and reader.

The Remote unit connects to the reader(s) and takes the reader data and sends it to the Central unit. Other control signals are also read and sent to the Central unit and vice versa.

The units are shipped as a matched pair. Up to 8 pairs of units can operate within the same environment without interfering with each other.

The Suprex RF can use either an enclosure mounted antenna or an external antenna.

Some advantages of using enclosure mounted antennas.

- Cost is less for hardware
- Simpler installation
- Not as conspicuous
- No need to specify coaxial cable lengths
- Less equipment exposed to the elements

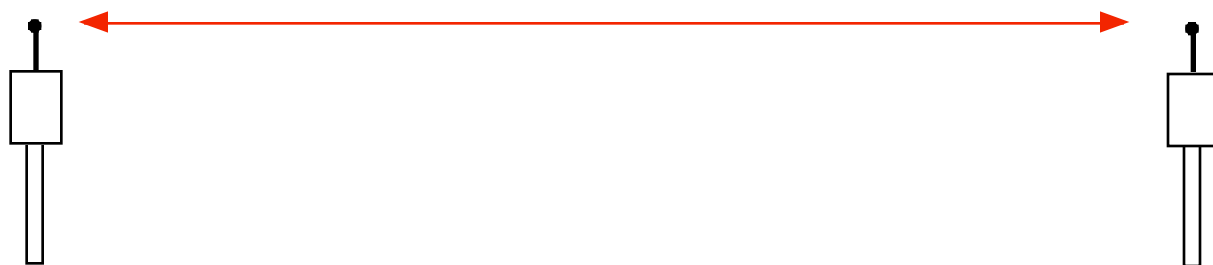
## Location Selection

One of the primary considerations when installing RF equipment is the location of the antennas and equipment.

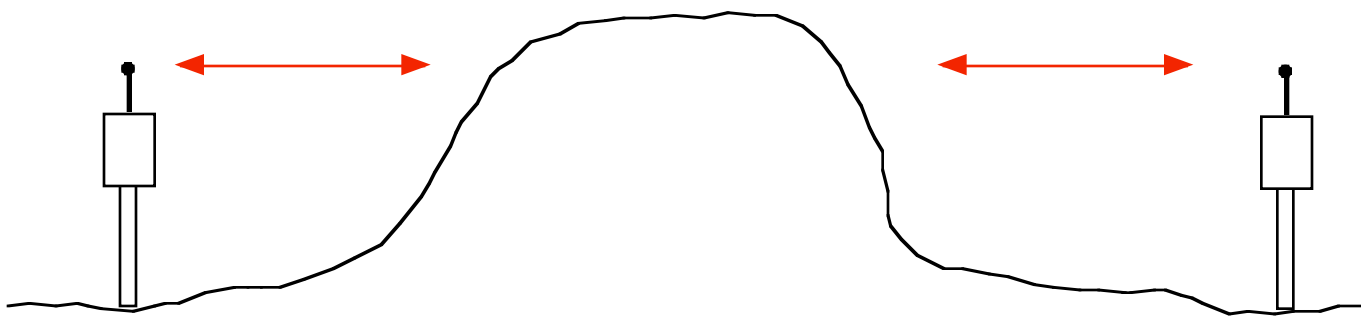
Radio frequencies in the 900 MHz and 2.4 GHz bands have characteristics that require “Line of sight” between the transmitter and receiver. The antennas of the transmitter and receiver should “see” each other without obstructions.

There are limited exceptions where the signal will still pass between the transmitter and receiver without line of sight placement. In some cases, the communication path will work but at a reduced distance.

Here are some scenarios in typical field installations for the standard model with the integral or enclosure mounted dipole antenna. The external antenna option is covered later in this manual and solves some of the problems presented here. There are some disadvantages to using the external antenna which have to be weighed when determining what type of antenna to use .

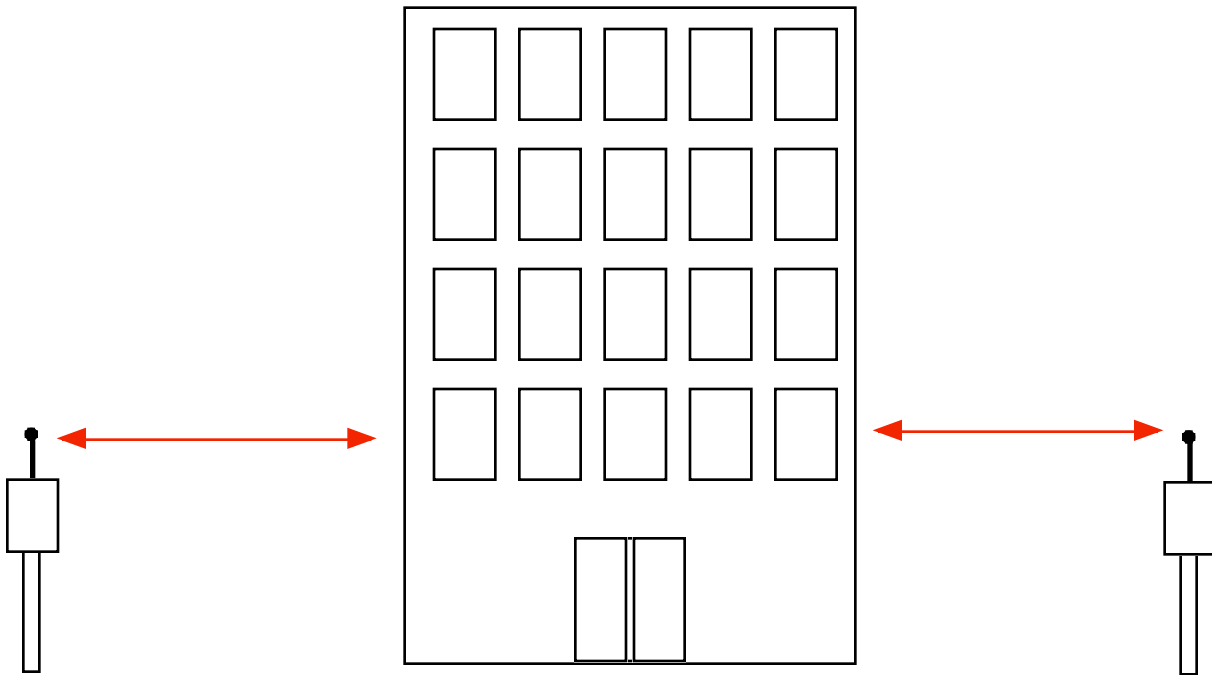


**A. Complete unobstructed path between units.** These units have a “Line of sight” view. Maximum distance is achievable. Actual distance will depend on type of antenna and environmental factors. Generally distances up to 1 mile can be covered.



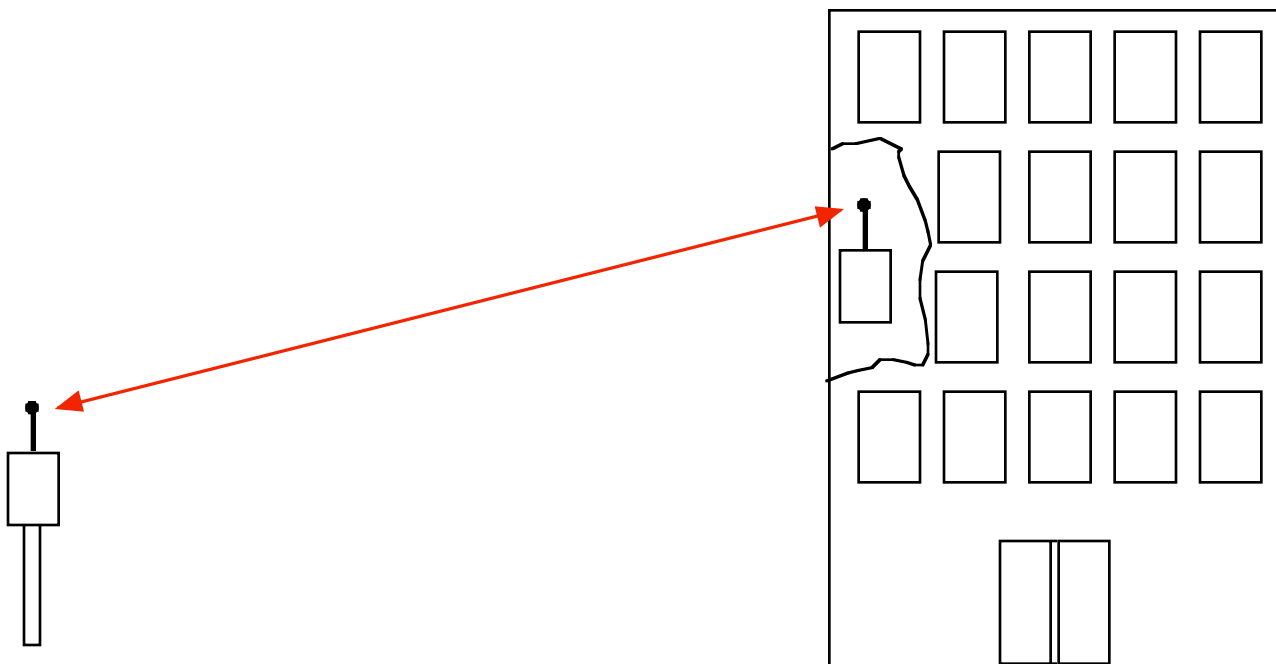
**B. Obstruction by terrain.** The path may be blocked by a hill or the location of one or both units is in a valley or ditch. Depending on the actual height and geometry of the obstruction, communication may still occur through refraction, reflection or a combination of both. Distance will be limited or communication may not be possible. If the obstruction consists of trees or other vegetation, the signal may be adequate during seasons when there are no leaves and degenerate during the growing season.

## Location Selection



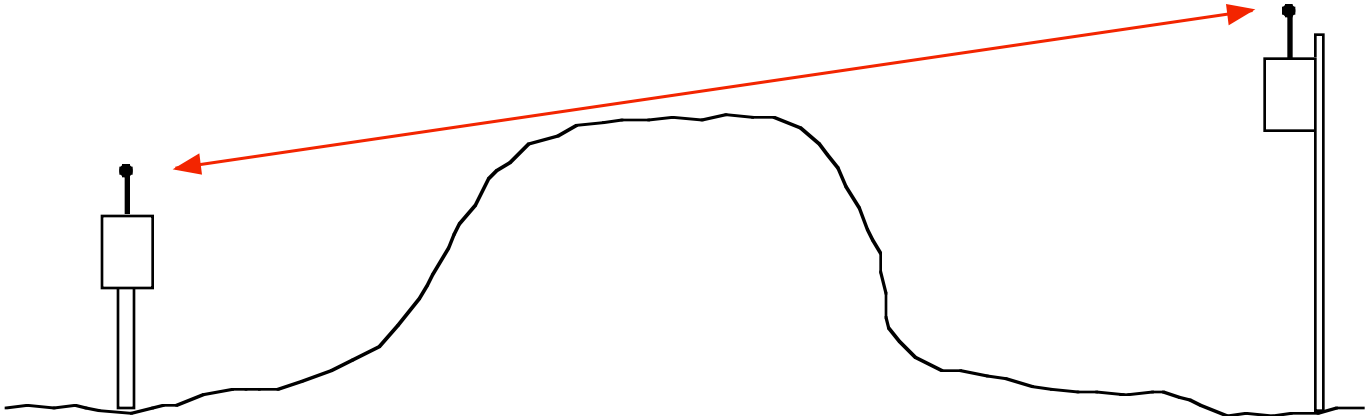
### **C. A building or other man made structure lies directly in the path of the units.**

The effect on communication will depend on many factors. The dimensions of the building, the construction materials used, etc. will determine if communication is possible or if a path can be made at a reduced distance. Some buildings are fairly transparent to the radio signals, others are not.

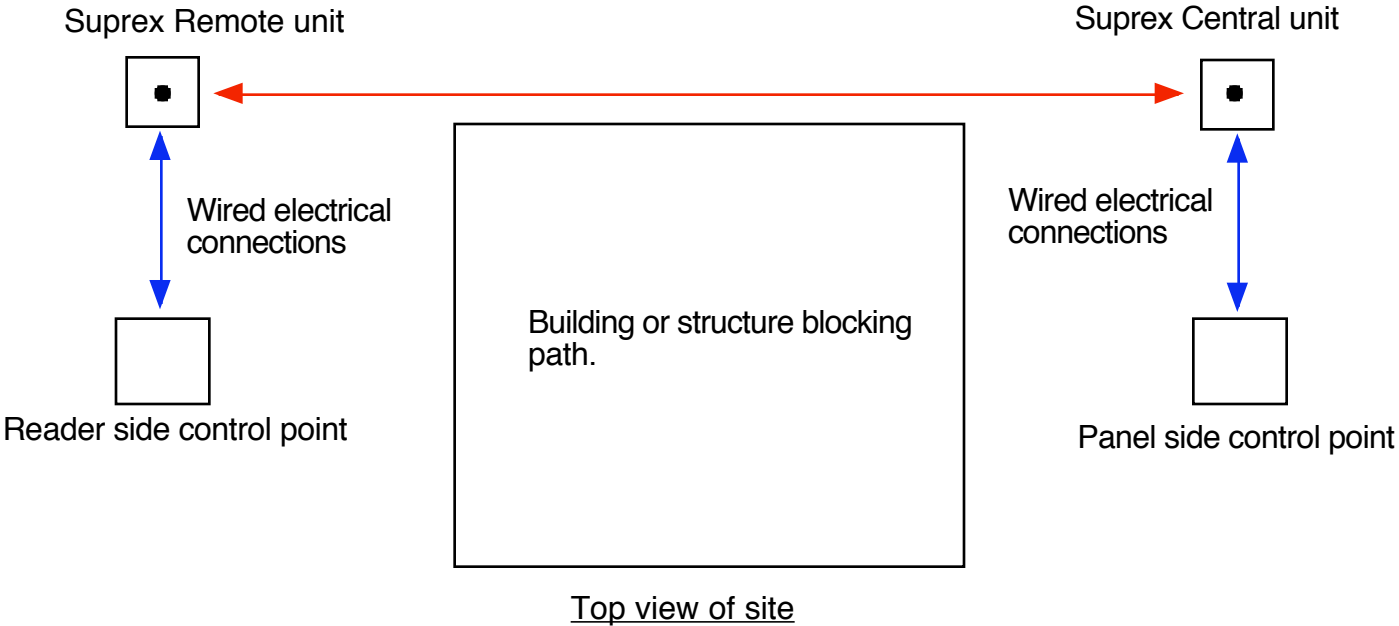


**D. One unit is mounted somewhere inside a building, the other unit is mounted outside with a direct path to the building.** The signal may make it through the building materials depending on type, how close to an outside wall the unit is located. etc. If the units are fairly close together (100 - 300 ft) then the signal will generally make it through to the other unit.

# Mitigation using enclosure mounted antennas.

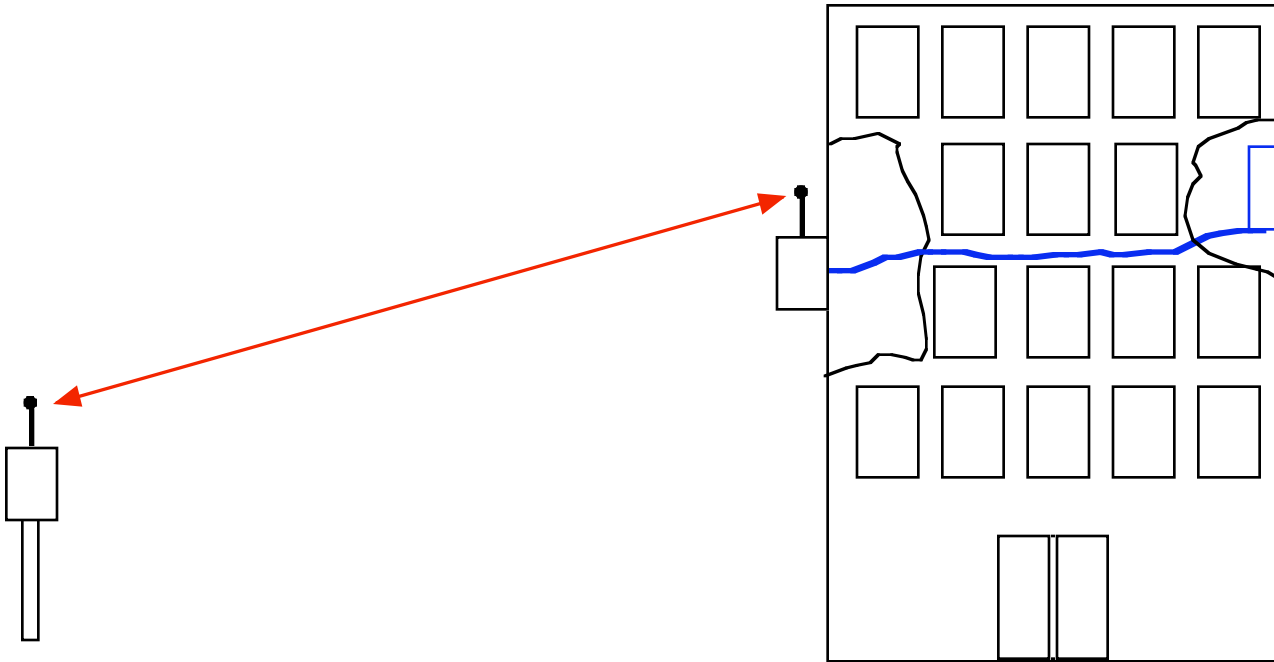


**A.** For cases where terrain or an obstacle blocks the path of the signal, the enclosure can be mounted higher up on a mast. The electrical connections can be run down from the mast to the control equipment at ground level.

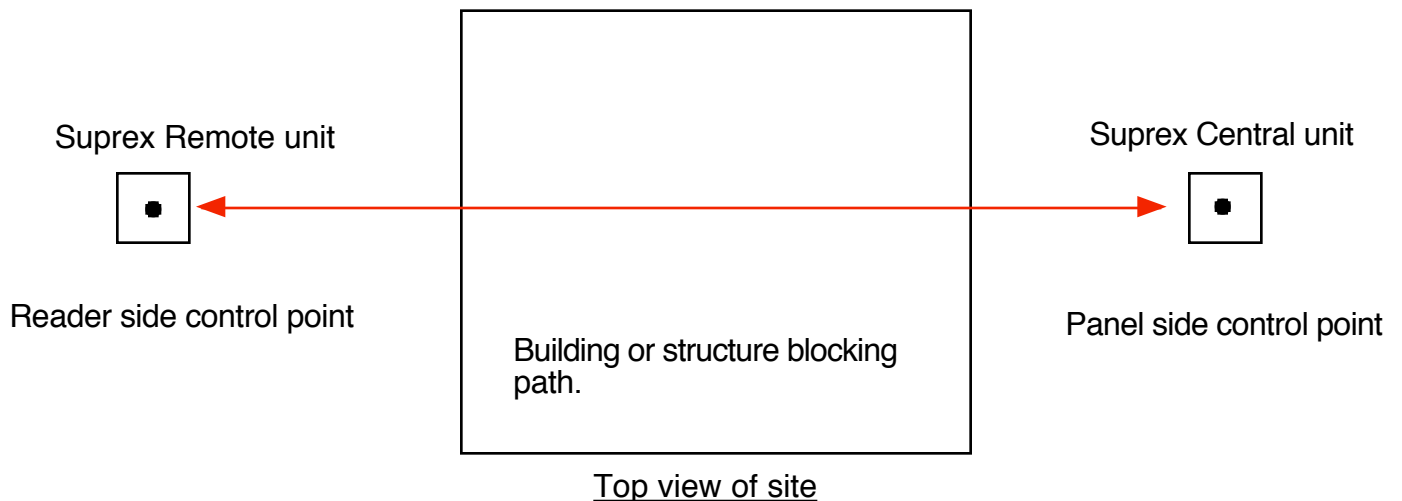


**B.** In the case where a building or structure blocks the path, the units can be mounted separate from the control point(s). This may be feasible if the distance from reader and/or the panel control point is within the distance limitations of the reader signals (typically 200 to 500 feet.)

## Mitigation using enclosure mounted antennas.



D. If the building will not allow a signal to transmit through to the outside unit, then the Central unit can be mounted outside the building to allow a clear RF path. The electrical connections to the Access Control panel can be made as a hardwired connection with the normal Wiegand signal length limits being applicable.



C. In some cases the building may not actually block the signal. This may be the case if the units are fairly close (100-600 feet). The signal may be able to establish a reliable link. This is entirely site dependent. Buildings with a lot of metal covering or structural supports are less likely to be transparent to the RF signal. Buildings constructed of wood and other non metallic materials will fare better.

## External antennas:

There are some situations that may require the use of a separate external antenna.

Some advantages of using external antennas are:

- Additional distance can be achieved by using a gain antenna
- The RF signal can be coupled out of an area where reception is difficult.
- Directional antennas can be used to reduce interference.
- The antenna can be located separate from the electronics.

Some disadvantages of using external antennas are:

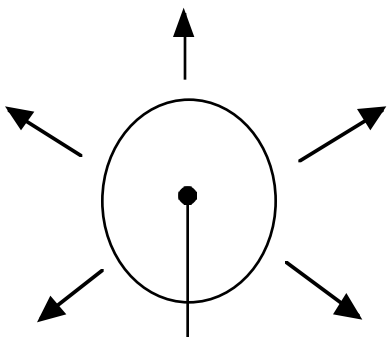
- Greater complexity of system and installation.
- Long lengths of coax cable can reduce signal levels.

Different antennas have different characteristics and different purposes.

Here is a general description of the antennas, some common terms used, and some of the applications for each type. This section is intended to be a guide as to what type of antenna would be best suited for an access control application using the Suprex RF System, and not as a definitive reference on antennas and RF signal propagation. There are many references available that describe in great detail the theory and practice of radio antennas . Some details are left out in the following examples in order to clarify the concepts.

## Yagi Antennas-

Yagi antennas provide both directivity and *gain*. Gain is an increase in relative signal strength that results from the antenna concentrating the signal. A Yagi antenna will direct the RF signal. A look at the radiation pattern for the antennas will help visualize this concept. The circles represent the radiation pattern.



Standard 1/4 or 1/2 wave whip antenna.

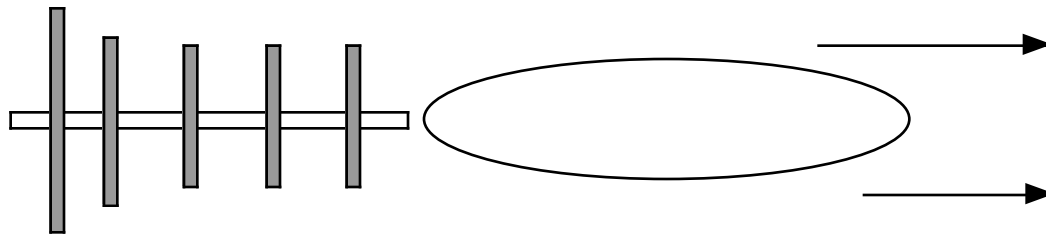
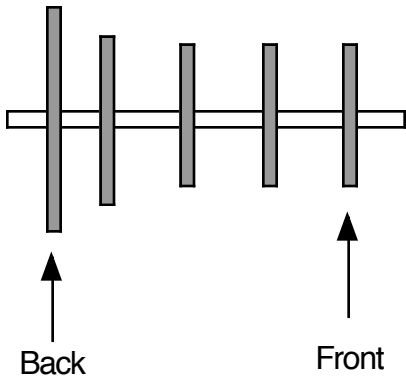
RF signal radiates in all directions.



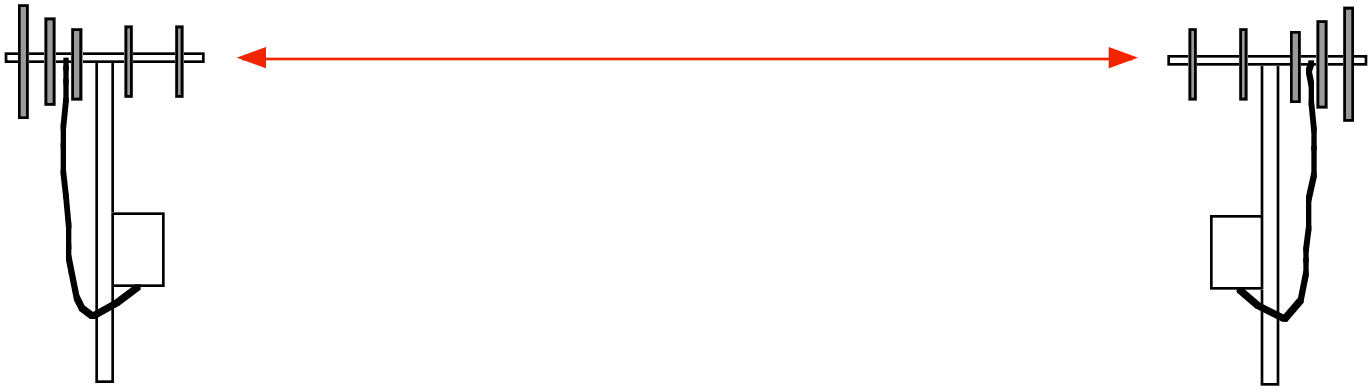
Pictured at left is a multi-element Yagi antenna

The back of the antenna will have the longest element, and the front will have the shortest. Most of the signal will be directed from the front.

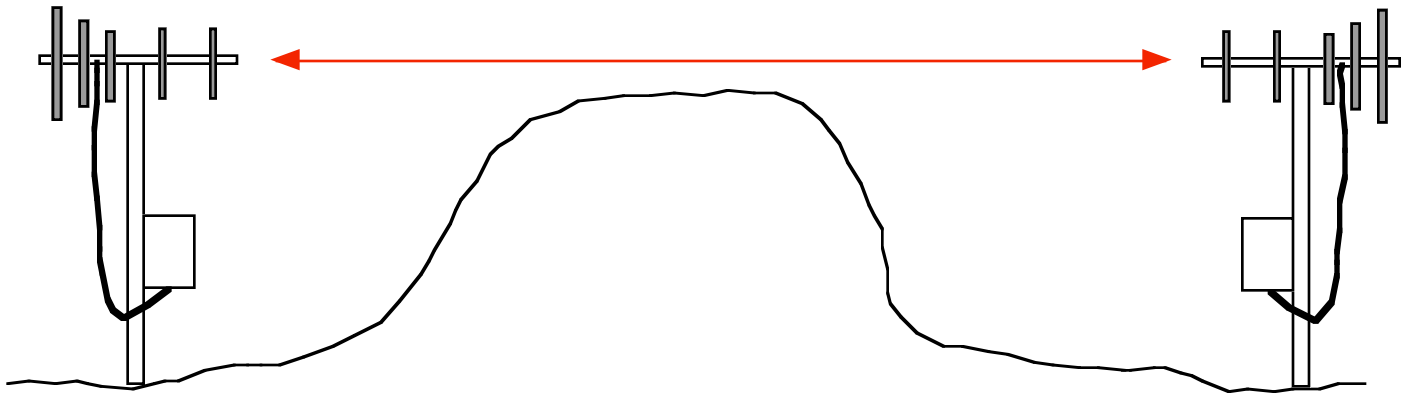
Another advantage of Yagi antennas is that signals that are not from the front direction will be reduced. This principle allows the Yagi antenna to be used to minimize interference from other nearby signals.



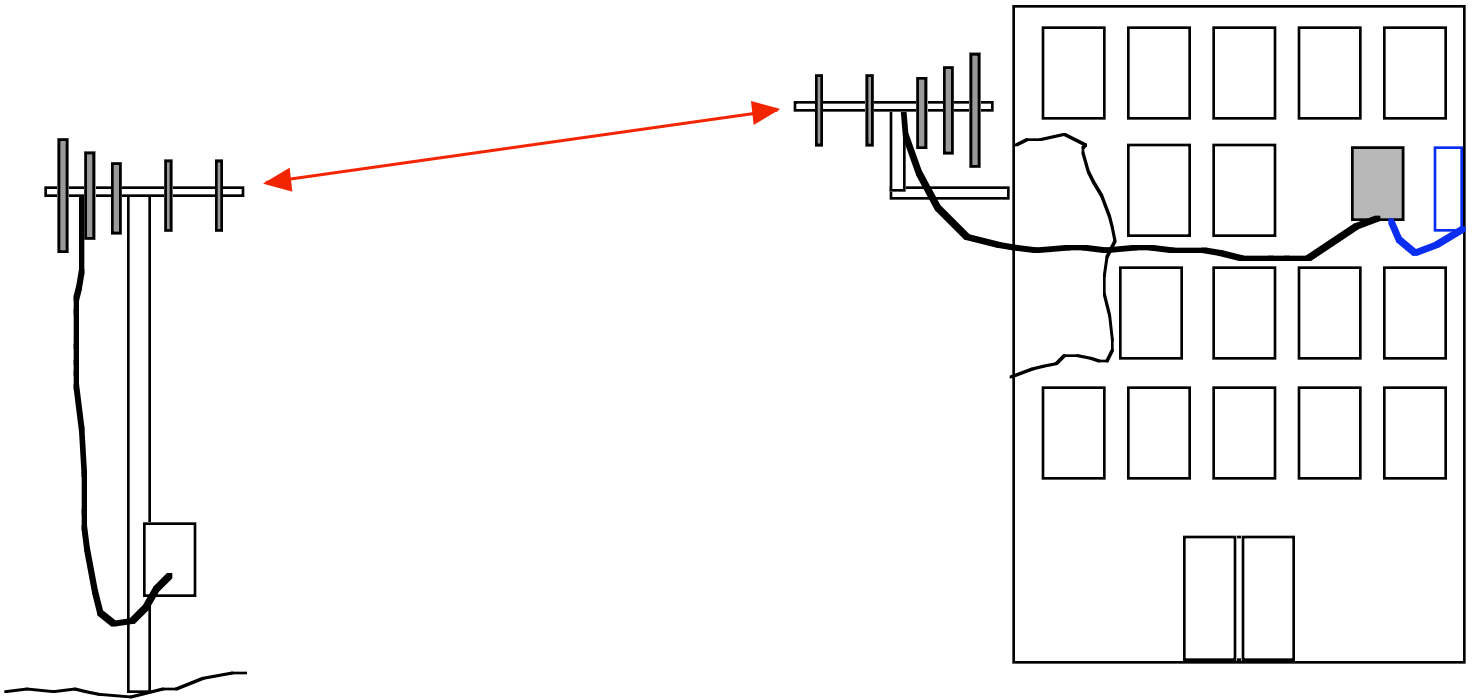
Yagi antenna- Most of the signal is sent in the direction of the front of the antenna.



**A. Complete unobstructed path between units.** These units have a “line of sight” view. This illustration shows both ends of link using Yagi external antennas. Over even terrain, up to 5 miles distance can be covered.



**B. Obstruction by terrain.** In this example, the external Yagi antennas are shown mounted on masts so that their height will clear an obstruction.



**C. Building does not pass RF.** The external antenna can also be used to get the signal outside of a building that does not have good RF properties. Additionally, the height of the building can be used to overcome obstacles that may be in the way of the Remote location.

In this example, the Suprex electronics are located close to the access control panel. The coax cable connects the externally mounted antenna to the Suprex electronics.

## **Considerations for selecting the proper Suprex RF model for the job.**

- 1. Distance between units.** If the distance is less than 2500 feet (1/2 mile) then the standard whip antennas at 900 MHz should work for the application. If greater distances need to be covered, a gain antenna (Yagi) can be used.
- 2. Type of terrain between the Central and Remote location.** If there are obstructions between the Central and Remote locations then an external antenna should be used with a mast of sufficient height to clear any obstructions.
- 3. Distance between control points and Suprex electronics and external antennas.** If using external antennas the distance from the Suprex enclosure and antenna has to be known. Coax cable assemblies come prewired and the cable length must be specified at the time of the order. Due to signal loss, it is not recommended to use a cable of over 50 feet.

# Suprex Site Application RF Worksheet

Complete separate worksheet for each pair

Date\_\_\_\_\_

Site Name\_\_\_\_\_ Order number\_\_\_\_\_

Location\_\_\_\_\_ Customer\_\_\_\_\_

Number of Suprex RF pairs to be installed at site \_\_\_\_\_

If more than 1 pair, distance between adjacent units\_\_\_\_\_

\_\_\_\_\_

Estimated distance between Remote and Central\_\_\_\_\_

Note any obstructions between pair such as trees, buildings, etc.\_\_\_\_\_

\_\_\_\_\_

Remote unit location :

Indoor ( ) Outdoor ( )

Describe location of Remote \_\_\_\_\_

If separate antenna is to be used, distance from Remote unit enclosure to antenna mounting point\_\_\_\_\_ Height of antenna\_\_\_\_\_

Central unit location :

Indoor ( ) Outdoor( )

Describe location of Central \_\_\_\_\_

If separate antenna is to be used, distance from Central unit enclosure to antenna mounting point\_\_\_\_\_ Height of antenna\_\_\_\_\_

Any other radio transmitters on / near site? \_\_\_\_\_

\_\_\_\_\_