

## Video Installation Tips

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### Understanding Wireless Video for CCTV

#### Introduction

Wireless video systems have become increasingly popular as a solution for many challenging CCTV applications. Dependable, high quality wireless equipment is available for indoor, outdoor and even mobile installations with transmission capabilities ranging from a few hundred feet to fifty miles or more. Some of the many applications include:

- **Wood Processing Mills**
- **Mining/Aggregate Facilities**
- **Ports/Ship Loading & Transportation**
- **Manufacturing & Heavy Industry**

5.8 GHz and 2.4 GHz systems are the most common for CCTV applications. The 5.8 GHz systems are the most popular for industrial use as they are less susceptible to signal interference. A maximum of 8 channels (cameras) is supported using the 5.8GHz frequency.

Wireless Frequency Comparison Chart			
Feature	5.8 GHz	2.4 GHz	900 MHz
Maximum Channels	8	4	2
Interference Risk	Very Low	High	Very High
Band Type	FM	FM	FM
Resolution	Excellent	Excellent	Excellent
Best Range Performance	Long	Medium	Short
Outdoor Performance	Excellent	Excellent	Excellent
Security/Privacy	Excellent	Good	Poor
License Free Operation	Yes	Yes	Yes
Signal Penetration:			
Wood/Drywall/Cinder Block	Average	Good	Excellent
Poured Concrete	Poor	Average	Good
Trees	Poor	Average	Good
Tinted/UV Coated Windows	Poor	Poor	Poor
Metal	None	None	None

Other wireless frequencies used for surveillance applications include 1.2 GHz and UHF but these are not common in industrial applications.

#### What to Know Before and When Installing a Wireless System

1. Line of Sight (LOS)
2. Transmission Range
3. Identify Potential Interference
4. Installing the Equipment

#### Line of Sight

A direct line of sight between the transmitter and receiver units is essential to obtaining the strongest, clearest signal and consequently the best video quality. In some situations this may be difficult to achieve due to the layout of the facility. Some peripheral obstruction may be acceptable as most wireless equipment allows for roughly 20% signal loss without affecting image quality. In cases where a clear line of sight is impossible, transmitters and receivers can set up as repeaters to relay the signal from unit to unit.



Actual wireless camera locations as shown by the red dots in this installation demonstrate the clear line of sight to the receivers where the picture was taken.

#### Signal Penetration of Obstacles

In some cases the signal will have to be transmitted near or through certain structures, In general wood, drywall, cinder block and poured concrete walls will allow signal penetration with some loss of resolution. Metal and steel reinforced concrete walls will entirely block the signal.



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### Transmission Range

All wireless equipment has a maximum specified transmission range. Therefore it's critical to have an accurate measurement of the distance between transmitter and receiver before the product can be selected for installation. Always be sure to choose an equipment package that easily exceeds the actual transmission distance to ensure trouble-free operation.

### Interference

Signal interference can easily degrade image quality and may be caused by a number of factors which should be considered before settling on the final installation points. Since metal can block a signal entirely, the transmitter/receiver link should not be installed where heavy equipment or other vehicles can pass through the signal beam. In most cases this can be avoided by mounting the equipment high enough to pass well above traffic areas. High voltage transmission towers also cause interference and should be taken into consideration before installation. The presence of existing wireless installations at adjacent buildings or facilities should also be investigated to determine what frequencies are being used. It's worth the effort to identify all possibilities before making the final system selection.

### Physical Installation

When installing transmitter and receiver units it is important to mount the equipment as securely as possible to minimize any movement caused by wind or vibration from passing vehicles or equipment. Wireless transmitters equipped with directional antenna need to be as stationary as possible to prevent the signal from wandering off the target receiver. This is especially important for long range applications where a separate antenna is installed with the transmitter.

Prior to final installation it is recommended that the equipment be bench tested to make sure the frequencies have been correctly set and the system is fully operational.

### Ground Plane

Ground plane refers to proximity of transmitter to the ground or other surface. If the transmitter is installed too low the signal may bounce off the ground or surface and cause multipath interference. In general the transmitter should be mounted at least 20 feet above any surface area to avoid ground plane issues.

### Power

Although the video feed is wireless the system still requires a power source so this must be taken into consideration at the planning stage. If providing power at the transmitter site isn't feasible due to cost or location, rechargeable battery packs are available. The battery pack can be installed in an easily accessible lock-box at the transmitter site. Solar power supplies are another alternative in cases where cable installation is not viable.



Receivers mounted at the control station are well above the ground plane to ensure there is no multipath interference.

Look for the next issue of **Video Installation Tips: Power for CCTV Systems**

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