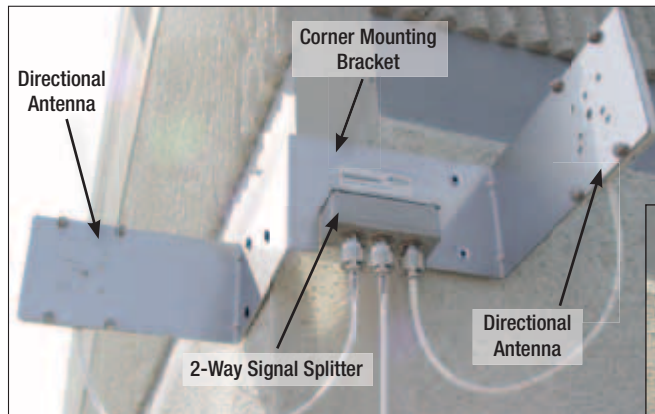


## Outdoor Antenna Application

Outdoor RF wireless networks experience the same factors such as reflections and multi-path as indoor networks. For outdoor wireless installations, a clear line of sight is optimal. Trees and leaves are obstructions to 802.11 frequencies so they will partially or entirely block the signal if not cleared.

Before deploying any wireless network, a site survey is recommended. The site survey typically entails installing an access point at each location where user groups are located and then monitoring the wireless signal strength by walking varying distances away from the access points using a laptop with site survey software. The result will show you where you may need more access points to provide sufficient coverage or where you may need to move an access point for optimal wireless connectivity. The antenna mounting varies by type of antenna and the structures available for mounting. For instance, an OMNI antenna usually looks for a clear 360° view of the area to be covered, while a DIRECTIONAL antenna needs a clear path reasonably equal to its beam width. Mounting hardware options to make these installations go smoothly are available when planning the site installations, such as the corner mounting bracket pictured above. L-com offers many options to the installer, please inquire.



HGX-UMOUNT04  
Universal Mounting Bracket  
shown left

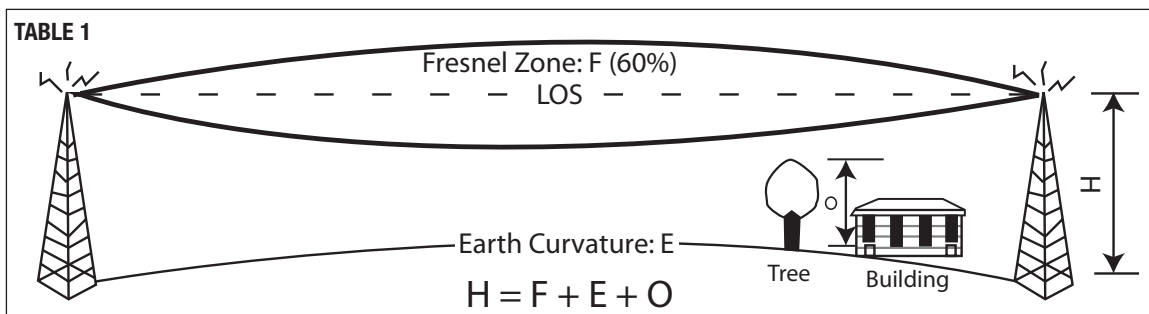
HG-2414P  
Flat Panel Antenna  
shown below



## Outdoor Antenna Installation Considerations

When installing a wireless LAN antenna several factors must be considered before installation in order to obtain optimal wireless signal connectivity. The correct installation height of an antenna depends on the factors outlined below.

- 1) Distance between the sites: The longer the link, the higher the antenna needs to be due to the earth's curvature. (This relation is not proportional) See table 1.
- 2) The Fresnel Zone: This is an electromagnetic phenomenon, where light or radio signals get diffracted or bent from solid objects near their path. See table 1 showing the 60% of Fresnel Zone values (accepted clearing on path). Add this to the earth curvature height.
- 3) Objects in the path: At a frequency of 2.4 GHz, you need a clear line of sight (LOS). Tree tops will reflect or ground the signal. The theory is that the height of the tallest object in the path of the signal should be added to the Fresnel Zone and earth curvature clearance heights. In your case, you should have to check the height of the trees, hills, buildings or any object on the link path and add this to the measurement for the total of the tower height. The above three conditions make up the Radio Line of Sight.



Understanding the elements that affect the antenna installation are critical to getting the maximum performance out of the wireless LAN system. If obstacles are present from the site survey results, additional antennas and repeaters may be added to compensate for barriers to the overall system performance. This is a critical factor in the site survey and the system planning to recognize any limitations in performance and address them from the start.



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