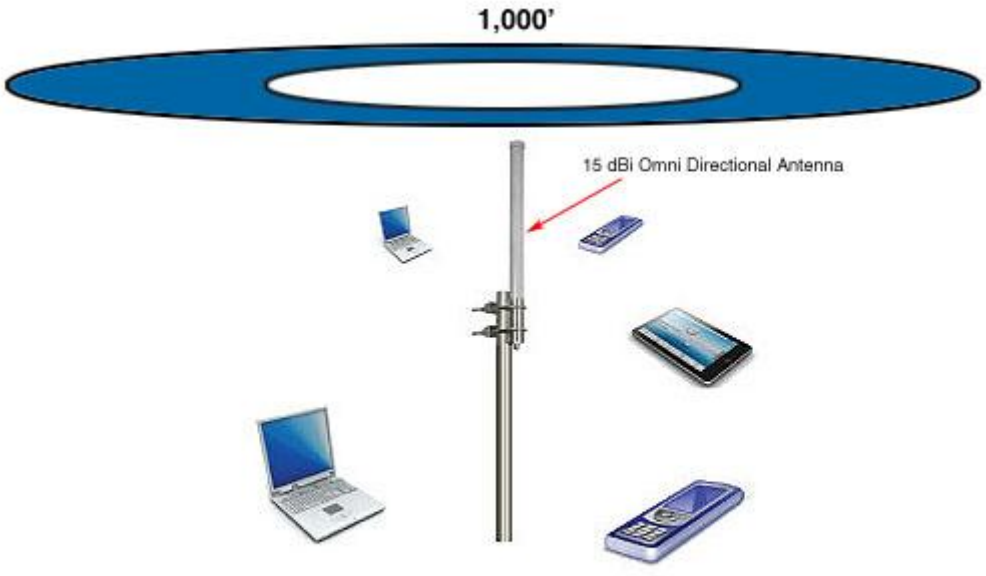
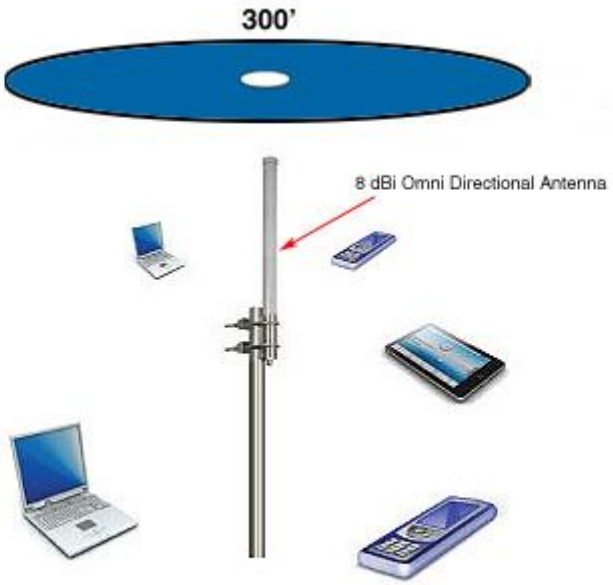
WiFi network design: antenna gain considerations

When designing a wireless network people often times choose a higher gain antenna thinking this will give them the strongest signal and highest quality WiFi connection. This is true in some cases but in some WiFi applications too much gain is a bad thing. For example say you want to set up a wireless network in an outdoor courtyard area for a café. For this application you would use an Omni directional antenna to provide 360° wireless coverage to your customers. In diagram 1 below you can see the centrally located Omni antenna is rated at 15 dBi. This high gain will project the WiFi signal well beyond the required 300 foot coverage area and actually give better signal quality to people far outside the courtyard. Users within the 300 foot area will actually see lower speeds and poorer signal quality as a high gain antenna is being used. For this application a lower gain antenna such as a 5 or 8 dBi antenna would actually provide better signal quality and coverage to the cafe' users (see diagram 2). Also a high gain antenna will not reach users closer to the ground say in a chair as the wireless signal is "stretched" and provides better horizontal coverage than vertical coverage. Conversely the lower dBi antenna provides more of a "donut" shaped signal pattern projecting the WiFi signal lower to the ground with better vertical reach. So depending on your wireless application, a high gain antenna might not be the answer.



Cafe courtyard user area 300'



Cafe courtyard user area 300'