



Planning a Microwave Radio Link

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Background

Most installers know that clear line of sight is required between two antennas, but there is a lot more to it than that. In this article, the basics of designing and planning a microwave radio link will be discussed.

Some manufacturers of OFDM (Orthogonal Frequency Division Multiplexing)-based equipment claim to offer fixed wireless systems with non-line-of-sight functionality. However, this article does not discuss the RF propagation issues associated with non-line-of-sight gear.

Explanation of Terms

Before getting to the nuts and bolts of designing a link, some fundamental terms and concepts need to be reviewed.

Free Space Loss

As signals spread out from a radiating source, the energy is spread out over a larger surface area. As this occurs, the strength of that signal gets weaker. Free space loss (FSL), measured in dB, specifies how much the signal has weakened over a given distance.

Figure 1 shows the formula to calculate FSL and what the theoretical loss would be at sample distances. The type of antenna used has no effect on FSL, since at any appreciable distance all antennas look like a point-source radiator. Note that the difference in FSL between a 2.4 GHz link and a 5.8 GHz link is always about 8 dB, regardless of the distance. This is one of the reasons why 802.11a wireless local area network (WLAN) devices will have less than half the range of a 2.4 GHz WLAN device (e.g., 802.11b).

Figure 1 – Free Space Loss (FSL)



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