
RADIO WAVE PROPAGATION MECHANISMS

Fundamentals and Applications

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Acronyms

EM Electromagnetic. 1, 2

RX Receive. 1

TX Transmission. 1

1 Fundamentals of Radio Wave Propagation

When electrons move through a conductor medium, they create EM waves that can propagate through in space. These waves can display different characteristics depending on the fundamental properties of their wavelength.



Figure 1: EM Spectrum

Transmission (TX) Receive (RX) Path loss is caused by dissipation of the power radiated by the transmitter as well as effects of the propagation channel. Path loss models generally assume that path loss is the same at a given transmit-receive distance¹. Shadowing is caused by obstacles between the transmitter and receiver that absorb power. When the obstacle absorbs all the power, the signal is blocked.

Variation due to path loss occurs over very large distances (1001000 meters), whereas variation due to shadowing occurs over distances proportional to the length of the obstructing object (10-100 meters in outdoor environments and less in indoor environments). Since variations due to path loss and shadowing occur over relatively large distances, this variation is sometimes referred to as **large-scale propagation effects** or **local mean attenuation**.