

## The Functions of Radio Antennas

Radio antennas have two fold functions. First of these functions is to radiate the radio frequency energy generated in the transmitter and fed to the antenna by a transmission line. In this capacity the antenna acts as the impedance matching device to match the impedance of the transmission line to that of free space. The other function of the antenna is to direct the energy into desired direction and to suppress the radiations in unwanted directions

A completely non directional or omni directional radiator radiates uniformly in all directions and is known as isotropic radiators. A point source of sound is an example of isotropic radiator in acoustics. There are no such things as an isotropic radiator of electromagnetic energy since all radio antennas have some directivity. However the notion of a completely non directional source is useful especially for gain comparison purposes.

The radiation pattern of an antenna is a graphical representation of the radiation of the antenna as a function of direction. When the radiation is expressed as field strength volt per meter the radiation pattern is a field strength pattern. If the radiation in a given direction is expressed in terms of power per unit solid angle the resulting pattern is a power pattern. A power pattern is proportional to the square of the field strength pattern. The co ordinate system generally used in the specification of antenna radiation pattern is the spherical co ordinate system. The antenna is located near the origin of the system and the field strength is specified at points on the spherical surface of radius. The shape of radiation pattern is independent of radius as long as radius is chosen sufficiently large. When this is true the magnitude of the field strength in any direction varies inversely with radius and so needs to be stated for one value of radius. For example in broadcast antenna work it is customary to state the field strength at a radius of one mile or one kilo meter. Often only the relative radiation pattern is used. This gives the relative field strength in various directions. Usually it is referred to unity in the direction of maximum radiation.

Antenna represents circuits with distributed constants but for the sake of analysis we can show the lumped inductance and lumped capacitance of an antenna system in the form of an oscillatory circuit. The circuit consists of a condenser whose plates are connected by a vertical wire which contains a certain amount of a self inductance. A radio frequency voltage is included at the center of the circuit. The frequency of the source usually corresponds to the resonant frequency of the circuit. This arrangement is often referred to as a dipole.

## About the Author

Tymon Hytem has worked in the electronics field for the past 15 years. He enjoys helping people decide on electronic gadgets from telephones to [XM Radio](#) and choosing the perfect XM Satellite Radio system for their needs.

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