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Definitions of Terms for
RADIO WAVE PROPAGATION

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RADIO WAVE PROPAGATION

Absorption The irreversible conversion of the energy of an electromagnetic wave into another form of energy as a result of its interaction with matter.

Angular Frequency The angular frequency of a periodic function is 2π times the frequency.

Atmospheric Duct A layer in the troposphere within which radio waves of sufficiently high frequency propagate with an abnormally low rate of decrease of amplitude with distance. The duct extends from the level of a local minimum of the modified index of refraction as a function of height down to the level where the minimum value is again encountered, or down to the surface bounding the atmosphere if the minimum value is not again encountered.

Attenuation Of a quantity associated with a traveling wave in a homogeneous medium, the decrease of its amplitude with increasing distance from the source, excluding the decrease due to spreading.

Attenuation Constant The real part of the propagation constant.

Attenuation Ratio The magnitude of the propagation ratio.

Attenuation Vector Of a field quantity, the vector pointing in the direction of maximum decrease of amplitude, whose magnitude is the attenuation constant.

Circularly Polarized Wave An electromagnetic wave for which either the electric or the magnetic field vector at a fixed point describes a circle. (*Note:* This term is usually applied to transverse waves. *See* Left-Handed Polarized Wave and Right-Handed Polarized Wave.)

Collision Frequency In a plasma, the average number of collisions per second of a charged particle of a given species with particles of another or the same species.

Conical Wave A wave whose equiphase surfaces asymptotically form a family of coaxial circular cones.

Critical Frequency The limiting frequency below which a magneto-ionic wave component is reflected by, and above which it penetrates through, an ionospheric layer when the waves are incident normal to the layer.

Cyclotron Frequency Same as Gyro Frequency.

Cylindrical Wave A wave whose equiphase surfaces form a family of coaxial or confocal cylinders.

D Layer An ionized layer in the *D* region.

D Region The region of the terrestrial ionosphere between about 40 and 90 kilometers altitude responsible for most of the attenuation of radio waves in the range 1 to 100 megahertz.

Debye Length That distance in a plasma over which a free electron may move under its own kinetic energy before it is pulled back by the electrostatic restoring forces of the polarization cloud surrounding it. Over this distance a net charge density can exist in an ionized gas. The Debye length is given by

$$l_D = \sqrt{\frac{\epsilon_0 k T_e}{e^2 N_e}}$$

where ϵ_0 is the permittivity of vacuum, k is Boltzmann's constant, e is the charge of the electron, T_e is the electron temperature, and N_e is the electron number density.

Direct Wave A wave propagated directly from a source to a point.

Direction of Polarization For an elliptically polarized wave, the direction of the major axis of the electric vector ellipse.

Direction of Propagation At any point in a medium, the direction of time-average energy flow.

E Layer An ionized layer in the *E* region.

E Region The region of the terrestrial ionosphere between about 90 and 160 kilometers altitude.

Effective Radius of the Earth An effective value for the radius of the earth, which is used in place of the geometrical radius to correct approximately for atmospheric refraction when the index of refraction in the atmosphere changes linearly with height. (*Note:* Under conditions of standard refraction the effective radius of the earth is 8.5×10^6 meters, or $\frac{4}{3}$ the geometrical radius.)

Electric Field A state of the region in which stationary charged bodies are subject to forces by virtue of their charges.

Electric Field Strength Same as Electric Field Vector. (*Note:* This term has sometimes been called the *electric field intensity*, but such use of the word "intensity" is deprecated in favor of field strength, since intensity connotes power in optics and radiation.)

Electric Field Vector At a point in an electric field, the force per unit charge acting on a stationary positive charge. (*Note:* This may be expressed either in newtons per coulomb or in volts per meter. This term has sometimes been called the *electric field intensity*, but such use of the word "intensity" is deprecated in favor of field strength since intensity connotes power in optics and radiation.)

Electric Flux Density A quantity related to the charge displaced within the dielectric by application of an electric field. The electric flux density is that vector point function