PulseLARSEN Antennas

Antenna Glossary

ADAPTIVE (SMART) ANTENNA

An antenna system having circuit elements associated with its radiating elements such that one or more of the antenna properties are controlled by the received signal.

ANTENNA

A metallic device used in the transmission and reception of electromagnetic waves. An antenna is a passive or an active device which permits transmission.

ANTENNA DIVERSITY

The use of two or more antennas to improve signal quality.

ANTENNA POWER GAIN

The ratio of the antenna's maximum radiation intensity in a stated direction to the maximum radiation intensity of a reference antenna (dipole, isotropic antenna) with identical power applied to both.

ATTENUATION

The loss in power of electromagnetic signals between transmission and reception points.

AZIMUTH

Horizontal direction expressed as the angular distance between the direction of a fixed point (as the observer's heading) and the direction of the object.

BANDWIDTH

A range of consecutive frequencies comprised of a band (i.e. the US cellular bandwidth is 72 MHz wide between the frequencies of 824 MHz - 890 MHz) over which an antenna shall perform without the need of any adjustment.

BASE STATION

In a cellular communication system, a base station could be considered a central mode of transmission and reception for the network. This station includes an omnidirectional antenna or several sectorial antennas.

BEAMWIDTH

The angle of signal coverage provided by an antenna. Beamwidth usually decreases as antenna gain increases.

CABLE ASSEMBLY

A cable that is ready for installation in specific applications and usually terminated with connectors.

CABLE LOSS

A numeric value describing the amount of signal loss from one point on a length of cable to another. This is measured in decibels (dB).

CENTER CONDUCTOR

A solid or stranded electrical conductor generally composed of copper and located at the center of the coaxial cable.

CENTER FED

Transmission line connection at the electrical center of an antenna radiator.

COAXIAL CABLE

Cable consisting of a single copper conductor in the center surrounded by a plastic layer for insulation and a braided metal outer shield. Coax is used to transfer radio frequency energy from the transmitter to the antenna.

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COLLINEAR ARRAY

A system of two or more antenna radiators arranged in a line and connected end-to-end to generate a directed field pattern (serial linear topology).

CONDUCTOR

A metal body such as tubing, rod or wire which permits current to travel continuously along its length.

COUPLER

Referring to on-glass antennas, a coupler is the two-piece interface between the coaxial cable on the inside of the glass and the radiator on the outside of the vehicle. It is designed to efficiently couple RF energy through the glass. The formulation of the glass and glass thickness normally have a substantial effect on coupler performance.

CURRENT LOOP

A point of current maxima (antinode) on an antenna.

CURRENT NODE

A point of current minima on an antenna.

DECIBEL (dB)

The standard unit used to express transmission gain or loss and relative power levels. See Basic Antenna Concepts.

dBd

Quantification of the gain for an antenna in comparison with the gain of a dipole.

dBi

The dB power relative to an isotropic source.

dBm

A measure of power based upon the decibel scale, but referenced to the milliWatt: i.e. 1 dBm = .001 Watt. dBm is often used to describe absolute power level where the point of reference is 1 milli-Watt. In high power applications the dBW is often used with a
reference of 1 Watt.

dBW

The ratio of the power to 1 Watt expressed in decibels.

DC GROUND

An antenna which is a dead short to a DC current, and has a shunt-fed design. To RF it is not seen as a short.

DIPOLE

An antenna - usually a half wavelength long - split at the exact center for connection to a feed line. Also called a “doublet”.

DIRECTIONAL ANTENNA

An antenna having the property of radiating or receiving electromagnetic waves more effectively in some directions than others.

DIRECTIVITY

The theoretical characteristic of an antenna to concentrate power in only one direction, whether transmitting or receiving.

DRIVEN ELEMENT

A radiator element of an antenna system to which the transmission line is connected.

EFFICIENCY

The ratio of useful output to input power, determined in antenna systems by losses in the system including losses in nearby objects.

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ELECTRICALLY SMALL ANTENNA

Some antennas (such as various low profile antennas, some base loaded whips and often rubber duckie portable antennas) are physically considerably smaller than either a 1/2 or 1/4 wavelength antenna. The challenge with electrically small antennas is to maintain radiating efficiency. A greater challenge is to design an antenna with adequate bandwidth. Careful design using high quality materials often overcome these obstacles.

ELEVATED FEED

Raises the radiating element above the vehicle roof level reducing obstruction.

ELEMENT, ELEMENTS

Typically a subset or a more elementary part of a larger antenna system. For example, an element of a Yagi-Uda array is normally a dipole antenna that, together with other dipoles, forms the array. An 8-element Yagi antenna would then ordinarily have 8 dipoles.

EMBEDDED ANTENNAS

Antennas directly integrated into a system such as an access point, a terminal or a handset. In most cases, this antenna is matched to the system and can not be used in other applications without modification.

E-PLANE AND H-PLANE

Antenna measurements in general and radiation patterns in particular must be performed with polarization in mind. Since polarization is defined as having the same orientation as an antenna's electric field vector, it is common practice to refer to measurements aligned with either the electric vector (E-plane) or magnetic vector (H-plane).

FIELD STRENGTH

An absolute measure in one direction of the electromagnetic wave field generated by an antenna at some distance away from the antenna.

FIELD TUNABLE

Antennas identified as Field Tunable are shipped with a cut chart the installer uses to select a desired operating frequency by tuning the antenna to resonance. Cut charts should be used as guidelines and are adequately accurate for many applications. However, Larsen recommends using appropriate RF measurement devices whenever possible for more accurate tuning.

FREQUENCY

The number of cycles per second of a sound wave

FRONT-TO-BACK RATIO

The gain of an antenna, in a specified direction.

GAIN

The increase in signal strength that is produced by an amplifier. The ratio between the amount of energy propagated from an antenna that is directional compared to the energy from the same antenna that would be propagated if the antenna were not directional. The gain of an antenna is the same regardless of if the antenna is used to transmit or receive.

GIGAHERTZ (GHz)

One billion cycles per second.

GPS

GPS (Global Positioning System) is a radio navigation system allowing land, sea and airborne users to determine their exact location, velocity, and time 24 hours a day, in all weather conditions, anywhere in the world.

GROUND PLANE

A man-made system of conductors placed below an antenna to serve as an earth ground

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HALF-WAVE DIPOLE ANTENNA

A center-fed antenna whose electrical length is half the wavelength of the transmitter or received signal. An antenna consisting of two rods (1/4 wavelength each) in a straight line, that radiates electromagnetic energy.

HELICAL ANTENNA

An antenna with a spiral conductor wound around a cross section. An antenna that has the form of a helix.

HERTZ (Hz)

A unit of frequency equal to one cycle per second.

HOTSPOT

Public area where wireless LAN Internet access is apt to be used (for high-speed access to e-mail, web sites, etc.). Users are usually unproductive while waiting. Examples are convention centers, hotels, airports, train stations, bus stations, restaurants, and coffee shops.

H-PLANE

Antenna measurements in general and radiation patterns in particular must be performed with polarization in mind. Since polarization is defined as having the same orientation as an antenna's electric field vector, it is common practice to refer to measurements aligned with either the electric vector (E-plane) or magnetic vector (H-plane).

IMPEDANCE

The Ohmic value of an antenna feed point, matching section or transmission line at a radio frequency. An impedance may contain a reactance as well as a resistance component.

MEGAHERTZ (MHz)

1 million cycles per second.

MOBILE ANTENNA

Refers to any antenna mounted on a vehicle. Includes a radiating element and a mechanism to fix the antenna to the vehicle.

MONOPOLE

Literally, one pole, such as a vertical radiator operated against the earth or a ground plane. A handheld rubber duck type of antenna will most likely be a monopole.

MOUNT

A mount is the device onto which a mobile antenna attaches. It is the mechanical and electrical interface between an antenna and the vehicle.

MULTI-PATH PROPAGATION

The result of interference from reflections off surfaces surrounding the antenna. This interference changes the target's return signal strength. Sometimes it is stronger and sometimes weaker than expected. The degree of multi-path propagation depends on the type of reflective surface; flat metal, towers and buildings cause the strongest effects.

NMO

Perhaps the most prolific of all mobile antenna mounts is the NMO. It enables one mount, inserted in a drilled hole in the vehicle body, to be used over the lifetime of the vehicle with many screw-on antennas.

NOISE

Any unwanted and unmodulated energy that is always present to some extent within any signal.

OMNIDIRECTIONAL

An antenna providing a 360-degree transmission pattern. This type of antenna is used when coverage in all directions is required.

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PCB
Printed Circuit Board.

PENTABAND ANTENNA
An antenna that combines 4-band GSM and W-CDMA 2100 to receive and transmit signals in all cellular bands. These antennas can be used in mobile, machine-to-machine, laptop, automotive, and all portable device applications for devices operating on GSM bands (GSM850, EGSM900, PCN1800, PCS1900) and W-CDMA 2100. They meet the need for small, high-efficiency, all cellular band antennas.

PLANAR ARRAY
An antenna in which all of the elements, both active and parasitic, are in one plane.

PLENUM-RATED
A term used describe Ethernet cable that has slow-burning, fire-resistant casing which emits little smoke. Plenum-rated Ethernet cable is used in overhead ductwork.

POINT-TO-POINT
A long-range wireless network between two points. Point-to-point wireless networks use directional antennas.

POINT-TO-MULTIPOINT
A communications channel running from one point to several other points.

POLARIZATION
The sense of the wave radiated by an antenna. This can be horizontal, vertical, elliptical or circular (left or right hand circularity) depending on the design and application.

PRINTED ANTENNA
All antennas made by means of a printed circuit process.

QUARTER-WAVE ANTENNA
An antenna with an electrical length that is equal to one-quarter wavelength of the signal being transmitter or received. A half-wave antenna cut in half, with one end grounded.

RADIATION PATTERN
The graphical representation of the relative field strength radiated from an antenna in a given plane, plotted against the angular distance from a given reference.

RADIATOR
A discrete conductor radiating RF energy in an antenna system.

RADOME
A typically rigid dielectric cover over the radiating portion of an antenna, and nearly always separated from the radiator by an air gap. A radome (the merger of radar and dome) has the purpose of protecting the radiator from natural weather phenomena and contamination by dirt. It usually includes aerodynamic shaping to minimize wind loading.

RECEIVER (Rx)
An electronic device which enables a particular signal to be separated from all and converts the signal format into a format for video, voice or data.

RELATIVE ANTENNA POWER GAIN
The ratio of the average radiation intensity of the test antenna to the average radiation of a reference antenna with all other conditions remaining equal.

REPEATER
A physical device that passes signals from one transmission medium to another without alteration.

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RoHS

The RoHS Directive stands for "the restriction of the use of certain hazardous substances in electrical and electronic equipment". This Directive will ban the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants from 1 July 2006.

SHIELD EFFECTIVENESS

A measurement of how well the shielding material (braid, solid tape, etc.) protects the external environment from radiation produced by the center conductor.

STANDARD IMPEDANCE

The nominal impedance associated with the transmission line and test equipment.

STANDING WAVE RATIO (SWR)

See VSWR.

TRANSMISSION LINE

The connecting link allowing the radio frequency energy generated by the radio to be delivered to the antenna.

TRANSMITTER

An electronic device consisting of oscillator, modulator and other circuits which produce a radio electromagnetic wave signal for radiation into the atmosphere by an antenna.

VOLTAGE STANDING WAVE RATIO (VSWR)

VSWR of the antenna is the ratio of the maximum to minimum values of voltage in the standing wave pattern appearing along a lossless 50 Ohms transmission line with an antenna as the load.

WAVE LENGTH

See Basic Antenna Concepts.

WHIP

The vertical portion of the antenna assembly acting as the radiator of the radio frequency energy.

YAGI

A directional, gain antenna utilizing one or more parasitic elements. Named after one of the Japanese inventors (Yagi and Uda).