



Wireless Communication in Electronics and its Working Principle

Daniel Victor*

Department of Electronics, University of Miami, Miami, Florida, USA

DESCRIPTION

As the demand for broadcast and wireless communication technology is growing day by day, the need of making plans a new type of antenna with features like broader impedance bandwidth and highly directive radiation pattern has increased. Directional antennas are generally utilized in applications to enhance the wireless systems' capacity and to reduce the impact of co-channel interference and multipath effects. Wideband antennas are used in different applications like satellite communication, radar, microwave imaging systems, remote sensing systems, Ground Penetrating Radar (GPR) detection, and medical applications. Alternatively, wideband antennas are used in broadband communication to replace the need for multiple antennas for different applications due to its functions like less complexity, lower power consumption and a greater compact footprint. Vivaldi antenna is one of the best candidates for a broadband directional communication system.

The Vivaldi Antenna, which belongs to the class of end-fire travelling antennas. The Vivaldi Antenna offers the characteristic of a slot line in which edge separation of the slot line extends better than $X/2$, where X is the length of the parameter. The non-resonant travelling wave mechanism of radiation of a Vivaldi antenna is produced through a higher-order Hankel function. The major requirement for the advantage of the Vivaldi antenna is that the bounded wave phase velocity must be same to or exceed the surrounding medium, which needs a continuous phase leading compensation of the travelling wave structure. The Vivaldi antenna presents end-fire radiation with a beam width about the same for E and H planes. For attaining constant beam width, the shape of the antenna is ultimately expressed in terms

of the wavelength, that is a dimensionless quantity. The radiating conductor slot plane of Vivaldi Antenna is designed on an alumina substrate. The video receiver module is designed using a Vivaldi antenna and an incorporated broadband video detector unit. Vivaldi antenna belongs to a category of a periodic, gradually curved slow leaky end-fire travelling antenna. The different portions of the antenna radiate different frequencies, but the length of the radiating part will become constant with wavelength. It has infinite bandwidth, however because of transition in the feeding section. Therefore transition from the transmission line to slot line the bandwidth is reduced. Another property of a Vivaldi antenna is constant beam width with respect to frequency, however it's also dependent on the proper designing of the antenna.

CONCLUSION

Two most important concerns for designing a Vivaldi antenna working in the microwave range are the transition in the feeding structure and the dimension and shape of the antenna to obtain a concentrated beam width. The Vivaldi antenna is mainly fed by using a balanced slot line. Some researchers use substrates with high dielectric constants and a small hole to connect the conductor. The system of tapered transition from micro strip to symmetric slot line and Vivaldi antenna with the change from micro strip to symmetric double-sided slot line. The transition in the feeding structure is carried out by tapering the micro strip line. Due to the transition in the feeding structure, the antenna produces low return loss over an intensive frequency range. The antenna additionally presents restrained beam width because of tapering of the slot line in the exponential form.

Correspondence to: Daniel Victor, Department of Electronics, University of Miami, Miami, Florida, USA, E-mail: dvictor@miami.edu

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