



Ultrawide Band, Compact Antenna for Low Frequency Applications, Including Military Vehicles and Wireless Communications

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a compact antenna for wideband and low frequency applications.

Overview

In applications such as military vehicles, ultrawide band antennas are needed to operate at very low frequencies. At such frequencies, the electromagnetic wavelength is very large. Consequently, any antenna that is used at these frequencies must be physically very large. This results in a very tall antenna that protrudes from the supporting object, such as a military vehicle, making it cumbersome, inconvenient and highly visible.

An “electrically-small” antenna refers to an antenna with relatively small dimensions compared to the wavelength of the electromagnetic fields it radiates. Electrically-small antenna elements may be used in low frequency applications to overcome issues associated with the physical size of the antenna required based on wavelength. Unfortunately, current electrically-small antennas typically have large radiation quality factors, meaning that they tend to store more energy than they radiate. Therefore, a need exists for an improved antenna design with significantly reduced size and improved performance at the same frequencies of current wideband antennas.

The Invention

UW-Madison researchers have developed a low-profile, ultrawide band antenna with improved performance at low frequencies. The antenna contains a ground plane substrate and a radiating element. The radiating element includes at least two loop sections, which are electrically connected to a feed network and to the ground plane substrate to seamlessly combine two modes of operation. The radiating element is configured to radiate over a first frequency band when the feed network provides an in-phase input signal to the loop sections and to radiate over a second frequency band when the network provides an out-of-phase input. The second frequency band includes a lower frequency than the first frequency band, enabling the compact antenna to cover a wide range of frequencies.

Applications

- Military-based applications including military vehicles
- Handheld wireless communication devices

Key Benefits

- Eliminates security issues associated with large antennas on military vehicles
- Improves antenna performance at a significantly smaller size requirement
- Reduces manufacturing cost of the antenna

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