

Design and Analysis for Log Periodic Dipole Antenna Array for Low Altitude Source Search using Multirotor Unmanned Aerial Vehicles (UAV)

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It is possible to conduct a low altitude source search over an area using a stabilized UAV equipped with high precision Global Navigation Satellite System (GNSS) equipment. If it can be assumed that the platform provides accurate positional information and can hold a stable position for periods of time sufficient to get accurate readings, then a properly designed LPDA array can be used to locate different source locations on the ground by flying patterns over an area.

Using an LPDA array for this application is a particularly good choice, given the broad bandwidth and narrow beamwidths that can be achieved by making proper design choices. In a circular array is proposed where each element for the array is a LPDA, all the elements would need to point radially outwards and be inclined downwards. The elements would also have to be prevented from coupling with nearby elements (Fig. 1).

The scanning beam from this array would roughly look like an annular cone. The annular shaped beam during a climb will pick up signals only from sources that are sitting at the periphery of the cone and further away. If the signals are received using a digitally controlled RF multiplexer, and if the element in the array being sampled is known, then it is possible to locate the emitting source on the ground, assuming the position of the platform is fairly precise.

The presentation will include a description of the design and construction of each LPDA element in the 1-3 GHz range. In addition, simulation results will be presented for each element and the entire array. Comments will be made on the efficacy of the overall scheme.

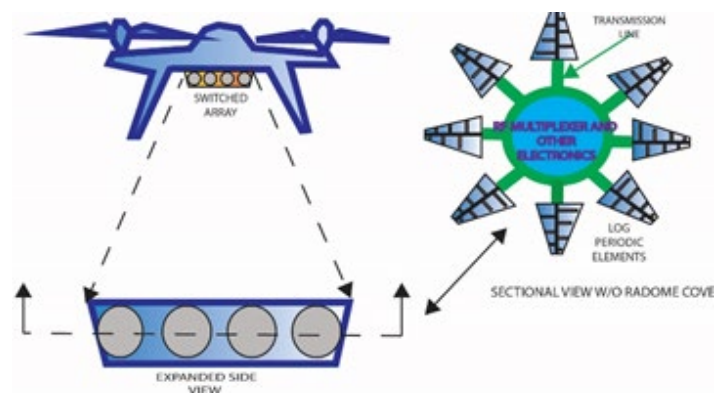


Figure 1. Illustration of array and mounting scheme.