

Compact Millimeter-Wave Antenna Designs for Line-of-Sight Communications in Permissive Operating Environments

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This presentation will provide small, lightweight millimeter wave antenna designs that will enable small unit tactical operations or small unmanned aerial vehicles (UAVs) to persist under electronic warfare conditions. An in-depth antenna trade study was conducted that evaluated several designs at millimeter wave, and selections were made based on system metrics with antenna performance, human factor considerations and costs. With the selected designs, the performance was optimized for high gain and sidelobe suppression. Preliminary designs for a novel “Pen-Cap” antenna for air applications, and an innovative, functional deployable and stowable “Bunker” antenna for ground tactical operations will be presented, both of which are critical for on the move operations in support of close air support missions. Here, communications need to be dependable, interoperable, and secure both within the unit, and with the aircraft the operators are communicating with to exercise control. The antenna geometries, radio frequency (RF) performance to include, return loss and radiation patterns, and prototype mechanical designs will be presented. The Pen-Cap antenna design illustrates the suitability for use on small UAVs with certain profiles / contours and seeks to minimize airflow disturbances to the platform. In the case of the Bunker antenna an impact assessment of the supporting mechanical rods on performance will be described. The flexible, but robust antenna deployment mechanism offers ease of use and increased maneuverability that are required for mission success. Measured results and correlation with simulations will be presented for both antenna types.*

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