

RQ4 Global Hawk LPDA Phased Array Simulation, Short Paper
Larry Wurtz, PhD
Custom Microelectronic Systems, Inc. and Dynetics
14 July 2019

The following paper is a very brief introduction of simulation work being performed to implement a 448 log periodic dipole array, LPDA, element phased array on a RQ4 Global Hawk. The phased array is conformally mounted to the inside contour of the canopy covering zone 7, which is shown in Figure 1.

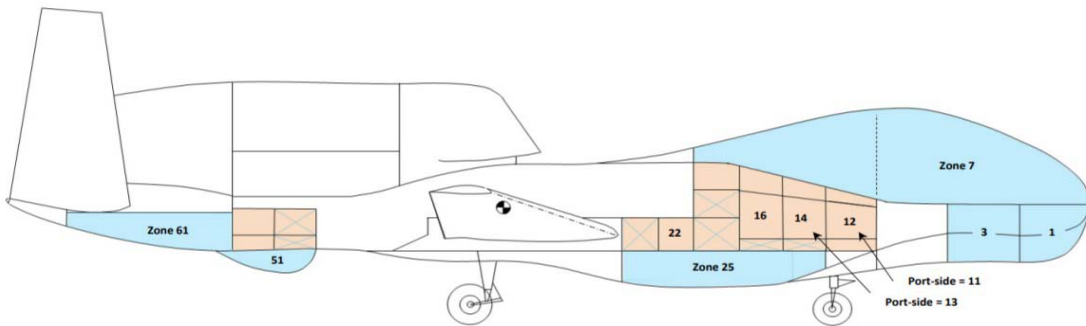


Figure 1. RQ4 Global Hawk Zone 7

The LPDA selected for the simulation, is a COTS part from L-Com with model number HG2458-08LP. The LPDA supports a bandwidth from 2.3 GHz to 6.5 GHz with 8dBi gain and vertical polarization. The antenna pattern of a single LPDA is shown in Figure 2.

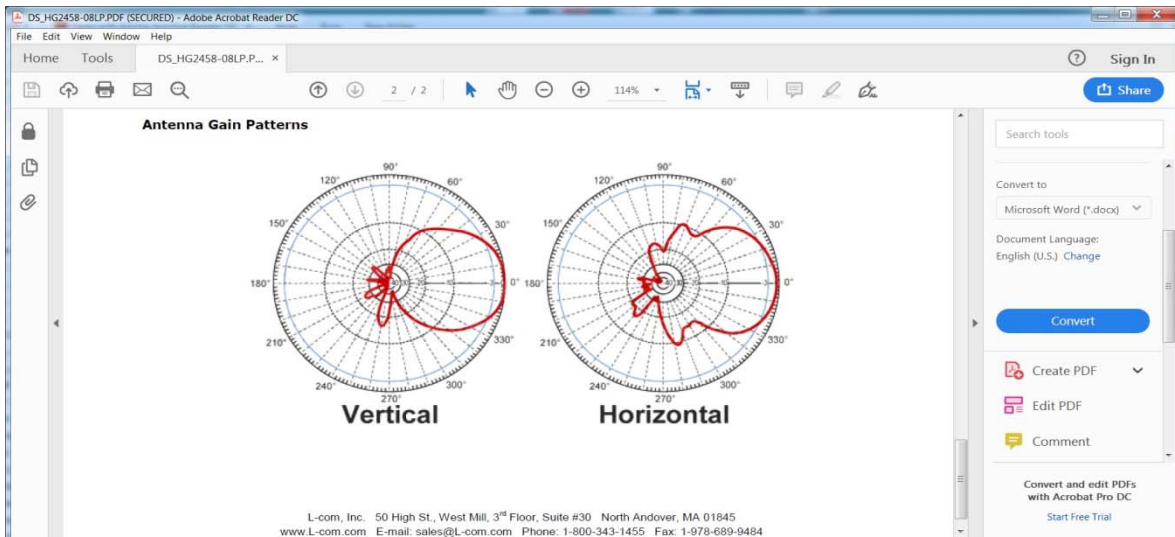


Figure 2. Antenna Pattern of LPDA

Figures 3 and 4 show 3D modeled views of the LPDA which is approximately 1 inch wide, 3.5 inches high, and 6 inches deep with fiberglass covering.

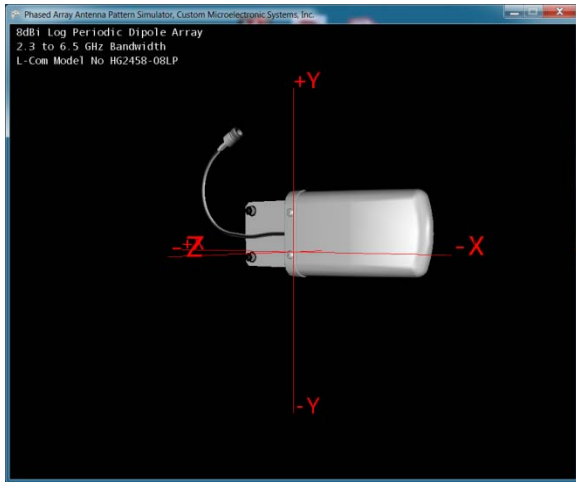


Figure 3. LPDA View 1

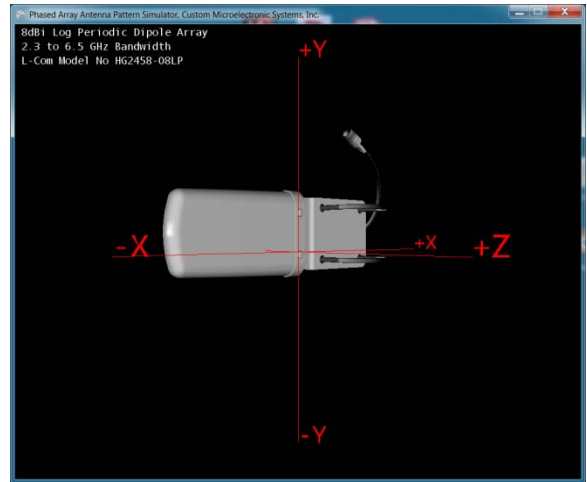


Figure 4. LPDA View 2

Figures 5 and 6 show the 448 LPDA element phased array conformally mounted to the inside zone 7 covering. For an enhanced appreciation of element positioning, the front tip of each LPDA is shown through the canopy housing which, in actual implementation, would be entirely under the canopy.

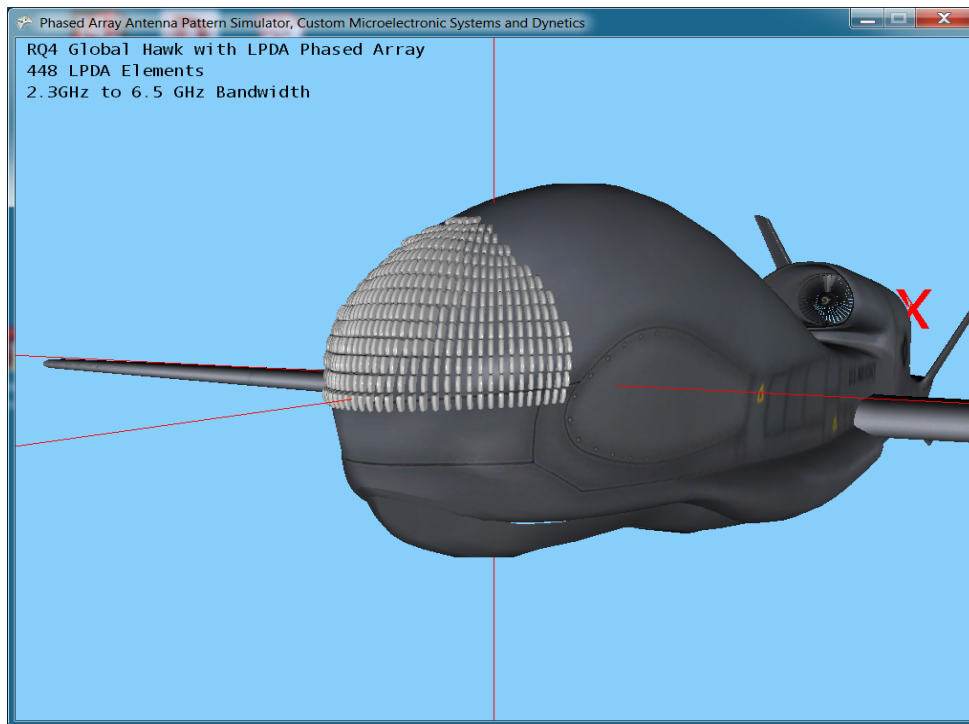


Figure 5. Phased Array View 1

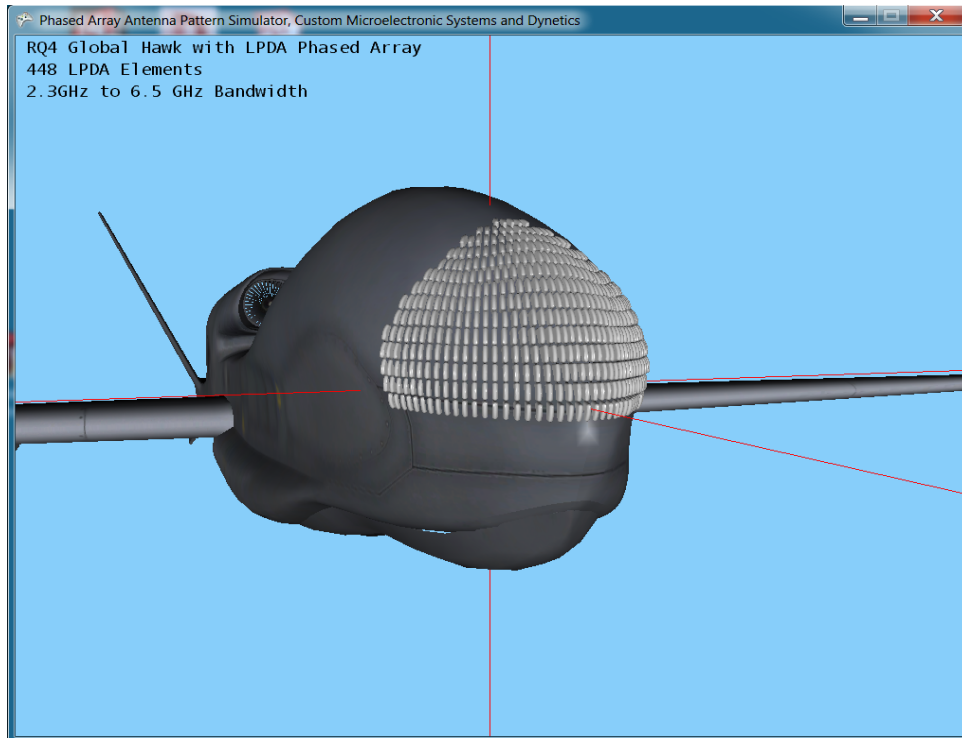


Figure 6. Phased Array View 2

Figures 7 and 8 show the phased array with Global Hawk removed from the scene.

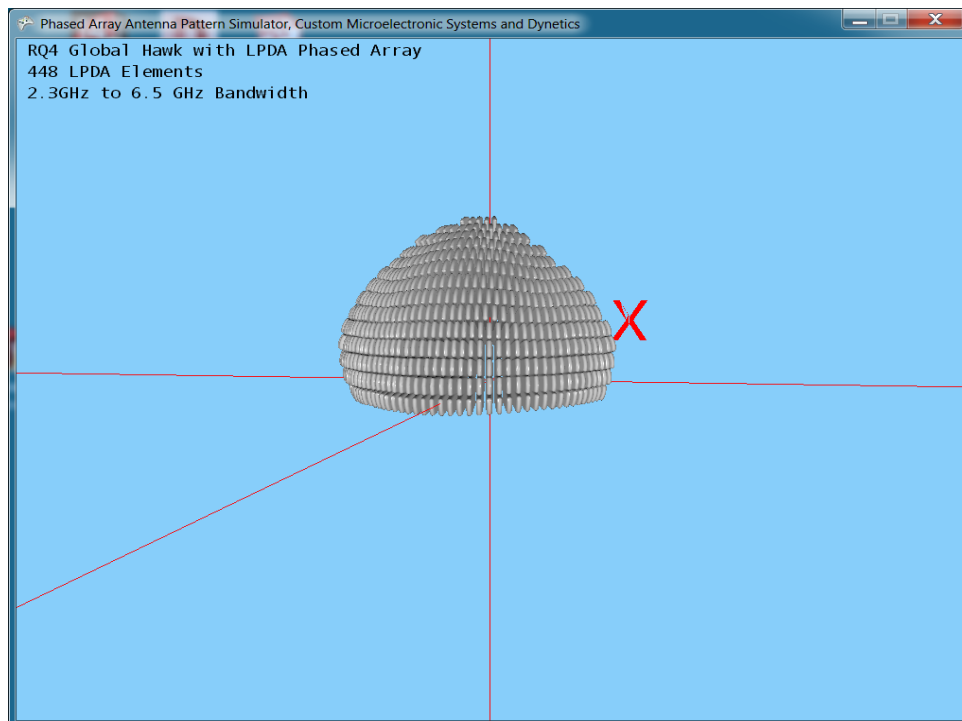


Figure 7. LPDA Phased Array Front View

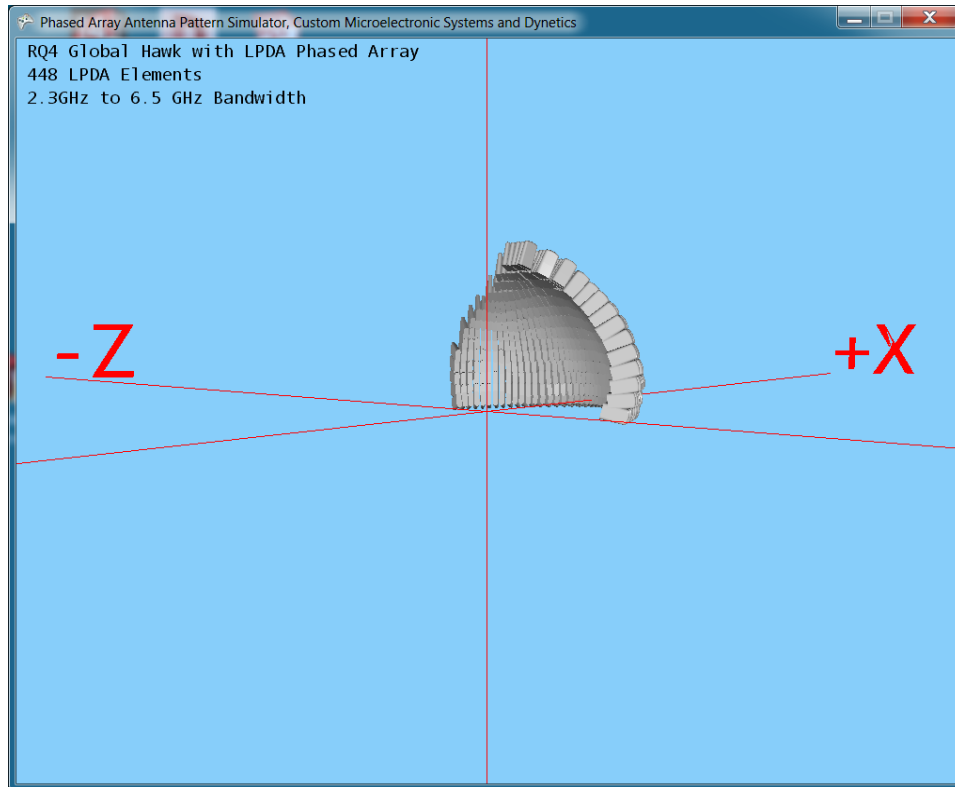


Figure 8. LPDA Phased Array Back View

Horizontal element spacing is $\lambda/2$ and vertical element spacing is 2.5λ . The phased array antenna pattern simulator with demonstrations shown on www.custommicroelectronicsystems.com under the "videos" tab is being modified to show all aspects of beamwidth and gain metrics in 3D for the conformal phased array of this application. When this simulation is completed, the phased array and simulation will be extended to an RF pod of a MQ1 Predator, shown in Figure 9.

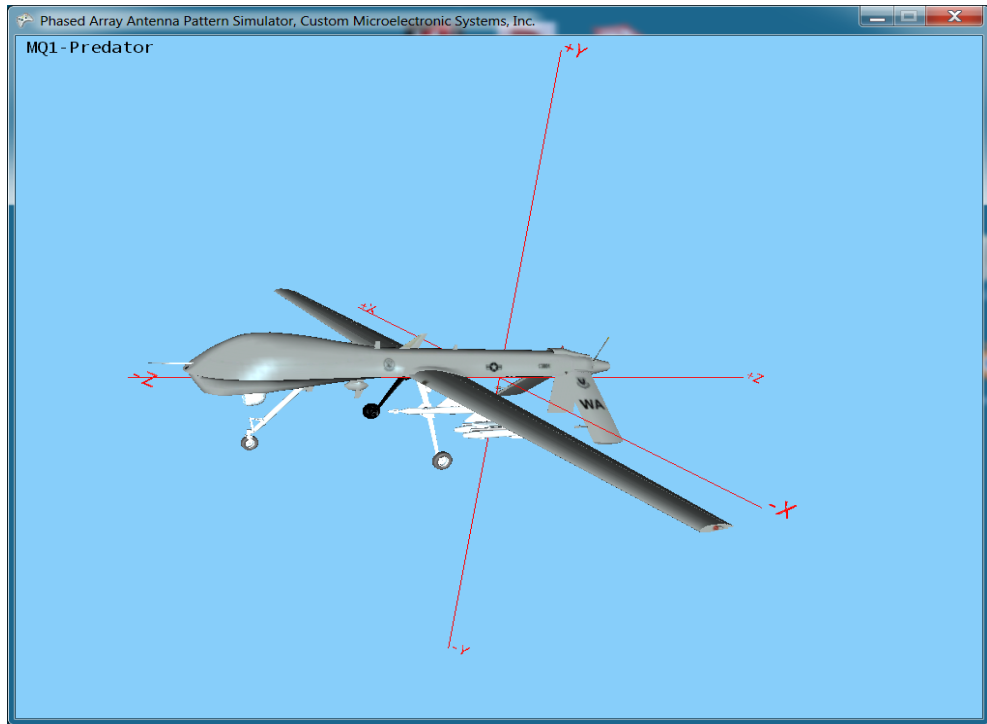


Figure 9. MQ1 Predator