



Description and theory of operation

The Skyline radar system was designed to detect, Extended Kalman Filter track, prioritize, and report objects and intruders within its Field of Regard (FOR). The system has been architected to support land, sea and air platforms by combining phased array antenna technology with advanced radar signal processing. It has nearly 200 hours of flight time and over \$10 million development invested by the USAF. Skyline operates from 5350 to 5460 MHz in 20 MHz Linear Frequency Modulated sub bands. The pulse width is 6 us. The Pulse Repetition Interval ranges from 30 to 24 us. Peak power is 70 Watts with antenna gain of 27 dBi. The search FOR is programmable with maximum of +/- 60 degrees in Az and +/- 30 degrees in El. The Track update rate is 200 ms and prime power consumption is 400 Watts. It weighs 70 pounds and measures approximately 2 feet wide by 1.5 feet tall by 1 foot deep. It is, therefore, field transportable and capable of fitting in the nose of a large aircraft. Its original mission was that of Global Hawk collision avoidance for the Air Force.

Specific Objectives to be accomplished:

Several other government agencies have expressed interest in Skyline as a low cost, size, weight and power solution to various missions ranging from coastal surveillance to missile tracking. Up until late last year, CEI had a radiation license that was obtained by the Air Force. Due to funding cuts, the Air Force has put its Global Hawk collision avoidance program on hold and let the radiation license expire. Meanwhile, CEI needs permission to radiate to demonstrate capabilities to other government agencies and to verify upgraded radar capability in signal processing.

Contributions not already investigated:

Skyline is a one-of-a-kind radar developed by a small business. The system is a state-of-the-art combination of capability, cost-effectiveness, and small form factor. It employs multiple high-performance FPGAs and is highly reconfigurable for solving a multitude of radar problems. It can track multiple 1 square meter radar cross section targets air-to-air at ranges greater than 10 nautical miles on in. This is quite remarkable given its cost, size, weight, peak transmit power and prime power consumption. The signal processing hardware employs no back plane; the boards can be plugged together in any configuration (X,Y,Z) and thus scaled to any level of complexity or form factor. It is, thus, a state of the art radar in a position to push the state of the art even further.