Raytheon Missile Systems
Experimental License Application #: 0233-EX-PL-2008

Exhibit 1 – Explanation of Experiment

Purpose: Raytheon Missile Systems ("RMS") has filed an experimental license application for the use of 33.5 – 36.0 GHz spectrum. The purpose of the experiment is to use these radio frequencies in an airborne radar system that will fly over unpopulated segments of the US to collect radar data to advance the development of innovative radar systems. The highly directionalized radar beam will be directed downward from the aircraft during the test flights (See Figure 1 below, with a visual depiction of the experiment.)

Advancement of the Radio Art: In keeping with the requirements of the Commission's Rules, 47 C.F.R. § 5.63, this test is expected to further Ka band radar capabilities in the US by developing more sophisticated radar and exploring the use of Ka band system technologies.

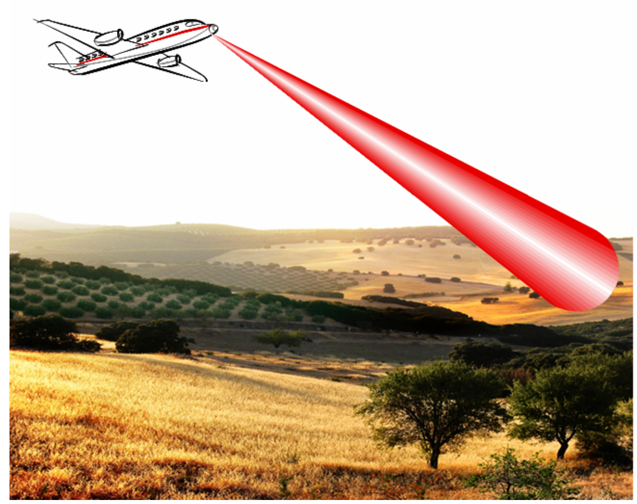

Figure 1, Ka Band Radar

Description of technology to be used: The radar system will be mounted on an aircraft which will be flying across remote, unpopulated areas of the United States. These tests will be conducted over five or six weeks each year, with an average of ten flights per week, each flight lasting approximately four hours (240 minutes). (This is a total flight time per year of approximately 240 hours across the entire year.) The duty cycle of the radar is quite low, at less than 10%. So the system in on for one minute, capturing data, and then off for the next ten minutes processing the data captured. In any four hour flight, the radar system is only on for approximately 24 minutes, or about 1/10th of the 240 minute flight time. That would mean that the radar is only on for 240 minutes per week of actual operation, assuming that the testing is actually possible for a full ten flights in a week. The flights will only take place, as noted above, for five or six weeks in a year. Assuming flights for six weeks, the total use of the system will be approximately 1440 minutes per year, across the whole year (which is actually just 24 hours of use across a whole year).

When the radar is in use, the aircraft will be at an altitude ranging from 2,000 to 18,000 feet above ground level. The free space pathloss of this signal will reduce the power level perceptible at the ground to a significantly weaker level that the level at the transmitter on the aircraft. For example, when the plane is at an elevation of 1 nautical mile, the pathloss will be -128 db, which means that the signal level at the ground will be only 2.703 milliWatts.

The system uses a narrow beamwidth, 2.5 degrees, with the signal aimed at the ground. This beamwidth will minimize the possibility of radio interference.

$F_{MHz} := 35000$	Operating Frequency of the link in MHz	
$GdBi := 35$	Antenna Gain in dBi	
$Pw := 2000$	Power in Watts	
$PdBW := 10 \cdot \log(Pw)$	$PdBW = 33.01$	Power in dBW
$EIRP := PdBW + GdBi$	Transmitter Effective Isotropic Radiated Power (EIRP) in dBW	
$EIRP = 68.01$	EIRP in dBW	
$EIRPdBm := EIRP + 30$	$EIRPdBm = 98.01$	
$R_{nm} := 1$	Range in nautical miles	
$f := 20 \cdot \log(F_{MHz})$	$f = 90.881$	Frequency in dB referred to 1 MHz
$r := 20 \cdot \log(R_{nm})$	$r = 0$	Range in dB referred to 1 nautical mile
$Loss := 37.8 + f + r$	$Loss = 128.681$	Path loss in dB between two isotropic antennas
$P_w := EIRP - Loss + GdBi$	$P_w = -25.671$	Power received at terminal of second antenna in dBW
$P_{mw} := P_w + 30$	$P_{mw} = 4.329$	Power received at terminal of second antenna in dBm
$Watts := (1.00 \cdot 10^{-3}) \cdot 10^{\left(\frac{P_{mw}}{10}\right)}$	$Watts = 2.71 \times 10^{-3}$	

Figure 2, Path Loss Calculation