

NGSC Antenna Range 1030 MHz / 1090 MHz
Data Collection

Purpose of the Data Collection

Northrop Grumman Mission Systems proposes to conduct outdoor range tests in Hanover MD to characterize the Multi-role Electronically Scanned Aperture (MESA). This antenna is under a Foreign Sales contract for use in an airborne air-search radar. The MESA antenna provides a 360-degree azimuth scan with no mechanical rotation. The concept for use has the antenna attached to the top aft section of an aircraft fuselage. It uses an advanced composite structure that supports side-emitting electronic manifold arrays and a "top hat" end-fire array. Its ultralight foam composite sandwich construction enables state-of-the-art performance at a fraction of current system weights, thereby allowing additional time on station for the aircraft. MESA will provide multiple surveillance applications, using pulse doppler radar waveforms for air search and pulse forms for maritime surface search. It also will provide in the same aperture an integrated civil and military IFF capability.

The data collected at the outdoor range facility will be used to support the design and RF characterization of the antenna at IFF frequencies (1030 and 1090 MHz) using a generic pulsed waveform (PRF 440 kHz, pulse width 100 nanosec) specifically chosen to not interact or interfere with the FAA IFF systems at the same frequencies. This data collection effort must be conducted at the outdoor range facility since the MESA antenna is too large to fit in a traditional indoor near-field scanning range. The antenna range will be used to collect calibration manifold pattern (element) data for the electronically scanned aperture, supporting the development of control algorithms for beam pointing, beam shape and other features necessary for tuning and integration of the antenna with an IFF system.

Figure 1 shows the geometry of the test range. The point source antenna at the west end of the range is a Scientific Atlanta 10 foot diameter parabolic reflector antenna with 30 dBi gain. It is used to radiate both the 1030 MHz and 1090 MHz characterization waveforms. It is at a fixed location and azimuth. For this evaluation, the MESA antenna is placed on a gimbal at the east end of the antenna range, and will be rotated as needed to collect data at various pointing angles to the point source antenna. It is important to note that for this evaluation, the MESA antenna will not be used as a transmit source, only receive. During test, the radiation from the test range point source is directed at the MESA antenna.



Figure 1 – Antenna Range Point Source to BWI ASR-9 Antenna Geometry

History of Test Range Data Collections at 1030 MHz / 1090 MHz

To date there have been 15 MESA antennas tested at the NGSC antenna range, using FCC licenses WC2XMH and KA2XGP. These data collections spanned over 12 years and thousands of hours. During these data collections the 1030 MHz and 1090 MHz data collections used the same point source location, direction, waveform and ERP as depicted above. There were no incidents of interference reported to Northrop Grumman (Westinghouse) during this testing. As a further safety measure the test range will contact the BWI FAA technical personnel as noted in the FAA concurrence prior to each radiation event, to help isolate any potential incidents.