

# ANTENNA CHARACTERIZATION

## Benefield Anechoic Facility

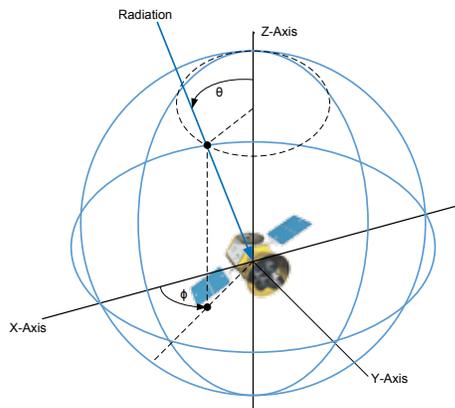


The Benefield Anechoic Facility (BAF) offers a variety of antenna pattern measurement capabilities in a particularly large indoor facility (264' x 250' x 70'). This highly flexible and secure indoor range provides extreme efficiency with uninterrupted automated test execution. This provides high throughput data collection rates.

Our antenna measurement environment supports the automated collection of amplitude and phase data on sixteen (16) antennas simultaneously in the frequency range of 100 MHz to 40 GHz. Relative and absolute gain measurements are available with 3-antenna techniques or NIST traceable references. To enhance our chamber's low-frequency ( $\leq 500$  MHz) performance and for other special requirements, time gating techniques may be applied. These techniques virtually expand the chamber's usable measurement volume by negating potential reflections from the walls, ceiling and floor at these lower frequencies. Antenna patterns can be measured in vertical, horizontal, right-hand circular, left-hand circular, and slant-linear polarizations. Analysis of polarization data and axial ratio measurements is also performed.

The size of our anechoic chamber typically allows up to approximately  $\pm 45^\circ$  of elevation swing and full azimuth rotation for a hoisted aircraft. The achievable elevation swing range depends on System-Under-Test (SUT) specific geometrical considerations and frequencies of interest. An 80-ft diameter, 175-ton capacity turntable is also available to support larger aircraft for  $360^\circ$  of azimuth coverage. Installed antenna patterns have been measured on numerous platforms including on larger aircraft.

On uninstalled antenna systems or on small host systems or models, antenna pattern measurements may be made over  $180^\circ$  of elevation ( $\Theta$ ) and over  $360^\circ$  of azimuth ( $\Phi$ ) providing a spherical characterization. Three principle plane measurements of the XY, XZ, and YZ planes are achieved.



Sample of an uninstalled or partial model antenna pattern geometry over  $180^\circ$  ( $\Theta$ ) and  $360^\circ$  ( $\Phi$ )



# Benfield Anechoic Facility (BAF) Antenna Characterization



## Types of Test

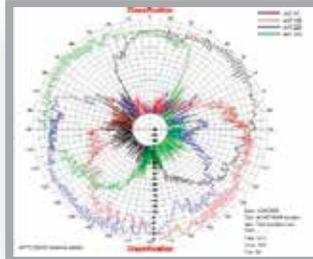
- Installed and uninstalled antenna patterns
- Polarization measurements and axial ratio measurements
- Supports all types of antenna systems including electronically steerable or AESA systems

## Frequency Range

- Frequency range: 100MHz - 40 GHz
- Frequencies per cut: Numerous - dependent on test requirement

## Data Products and Analyses

- Coherent phase and amplitude
- Absolute gain
- Beamwidth, Sidelobes, Backlobes
- Polarization
- Parallax correction
- Beam-taper correction
- Polar and Cartesian plots



## Positioners, hoists and model towers

- Variety of positioners and model towers may be used to position and rotate test article 10' – 50' in the air
- Two (2) 40-ton hoists and an 80-ft diameter, 175-ton capacity turntable

## Angular Limits, Accuracy and Resolution

- Angular accuracy: 0.1° (typically 0.25°)
- Azimuth rotation: 360°
- Resolution: .01°
- Elevation rotation (installed): Static - variable depending on SUT and chamber geometry (typically ± 45° for hoisted aircraft)
- Elevation rotation (uninstalled or small host systems): unlimited

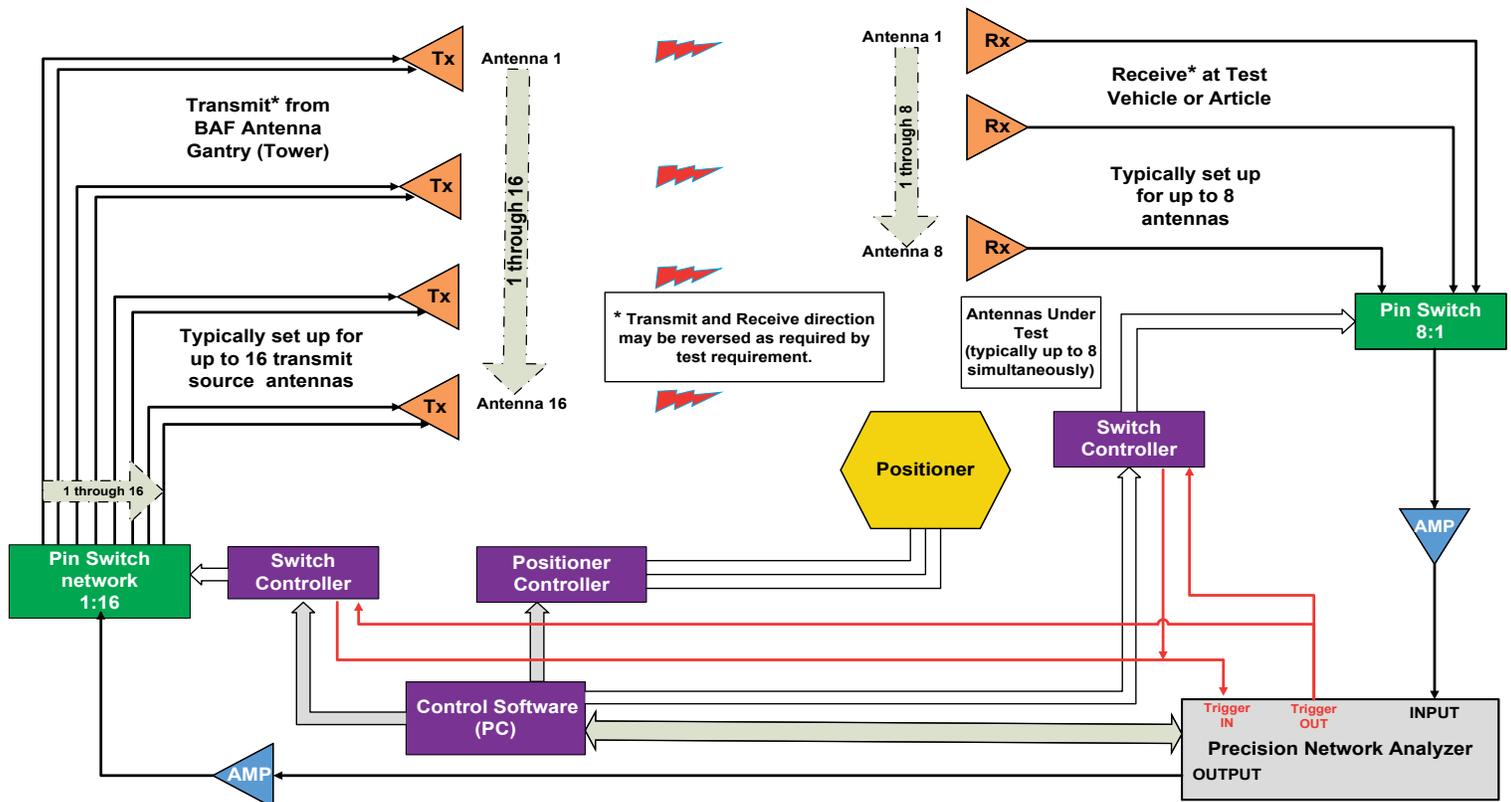
## Transmit and Receive channels

- Supports up to 16 transmit and 8 receive channels or vice-versa
- Simultaneous transmission/reception with automation

## Additional Information

- Dynamic range: >60 dB across operating frequency
- NIST Traceable Calibrations available
- Smaller anechoic chamber is available to test small, standalone objects from 8 GHz – 18 GHz with simple test geometries

## Sample Simultaneous Multi-Antenna Test Configuration



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