

Team 311

Senior Design

FPGA Enhanced Digital Beam Steering Phased Array

Customers Need

Although senior design encourages students to have a strong relationship with their sponsor, Team 311's sponsor, L3Harris, has allowed the team a more open-ended approach. Therefore, we have no clear customer statement to present. Based on the project description and specifications we were able to develop needs and requirements.

Needs:

Needs	Ref #
Control radiation direction	1
Transmitting device	3
Digital to analog signal conversion	4
FPGA/MCU controlled	5

The two most important needs are:

- FPGA/MCU controlled
 - The FPGA/MCU controller will allow the user to control the system. This is an important need because you will not be able to steer the beam without a main controller.
- Control radiation direction
 - This is an important need because it is one of the main aspects of beam steering. You must be able to control the direction in which the transmitted signals will be directed.

Requirements:

Requirements	Need Ref #
Operating Frequency is with in ISM Bandwidth < 30 dB	2
4 Channel DDS	3
Measurement of Phase Difference	1
Optimum radiation beam control algorithm	4
Manipulate digital baseband signal	4

Materials:

- Antenna array
- RF up-conversation channel
- DAC (Digital to Analog Converter)
- MCU/FPGA

Explanation of Results:

Since we do not have any clear customer statements, we are able to develop our own explanation of the results. The final result will be a FPGA based beam steered away, which the user will be able to control the phase delay and direction of the system.