

# Design, Fabrication, and Measurement of On-Board UHF Turnstile Antennas with Optimized Radiation Patterns

*Saturday, 12 December 2020 16:18 (4 minutes)*

In this study, on-board UHF turnstile antenna systems for CubeSat applications are designed in a simulation and optimization environment in order to obtain different radiation requirements. A turnstile antenna is a configuration with four monopoles that are placed circularly with successive  $90^\circ$  phase differences between them. The preference of turnstile structures in CubeSat systems is due to their inherent circular polarization and high gain when compared to monopole and dipole antennas, which are typically linearly polarized and omnidirectional. Instead of defining numerical specifications to conceptualize a design, the performance limits of turnstile antennas are first observed via optimization sweeps by studying the orientations of antenna arms in simulation environment. In order to feed antenna arms by successive  $90^\circ$  phase differences between them, a four-way quadrature splitter circuit is designed and fabricated. Antenna pattern measurements are conducted in an anechoic chamber by connecting monopole antenna arms to the fabricated power splitter circuit, while the arms are oriented in the optimized directions and placed on a generic 1U CubeSat platform. Integration of the designed antennas into real CubeSat systems with deployment mechanisms is under investigation.

**Primary authors:** DOLAPÇI, Türker (Middle East Technical University, Turkish Amateur Satellite Technologies Organization); ŞAHİN, M. Barış (Middle East Technical University); Dr ERGÜL, Özgür (Middle East Technical University)

**Session Classification:** Room #1