Strategies for Co-existence of Radio Telescope Arrays
with Broadcast Stations
and Wireless Communication Systems

Principal Investigator: Dr. Moeness Amin

Project Summary

This project is a collaboration between the Center for Advanced Communications, Villanova University, Temple University and Embry-Riddle Aeronautical University which brings synergy in applying emerging signal and array processing techniques for shared astronomical frequency spectrum. The objective of this research is to enable effective use of broader radio frequency (RF) spectrum for communications while minimizing the data loss to radio astronomy, thus allowing successful astronomical observations for search and discoveries of extraterrestrial intelligence. This is achieved by suppressing, or at least significantly mitigating, radio frequency interference (RFI) infringing over astronomical data bandwidth. The approach includes mitigation techniques for both cooperative and non-cooperative RFI sources. Cooperative interferences originate from authorized secondary users and strive to reduce their effects on the telescope array through agreeable transmit/receive strategies. On the other hand, non-cooperative RFIs originate from uncontrolled emitters where no transmit strategies can be enforced. For this class of RFIs, the telescopes have no prior knowledge of emitters’ transmit power, spectrum, modulation scheme, duty-cycle, or locations.