

## **Wideband Monostatic Co-Polarized Co-Channel Simultaneous Transmit and Receive Omnidirectional and Broadside Antenna Arrays**

Ehab A. Etellisi, Mohamed A. Elmansouri, and Dejan S. Filipović

Department of Electrical, Computer, and Energy Engineering, University of Colorado, Boulder, CO 80309-0425 USA

Wideband omnidirectional and broadside co-polarized monostatic “circulator-less” antenna arrays are demonstrated for co-channel simultaneous transmit and receive applications. These proposed array topologies “ideally” cancel and “practically” mitigate the significant self-interference at the receiving port. Specifically, linearly co-polarized omnidirectional circular arrays of four-element wideband monocone antennas excited with several phase modes are presented. The simultaneous excitation of these phase modes in a circular array provides ideally infinite isolation. However, once the realistic beamformer network is used, the isolation between the transmitter and receiver reduces and becomes bound by the internal leakages. To suppress the strong leakages, a four element single-layer circular array that is excited simultaneously with mode 1 at transmitting and mixed-modes at receiving sides is demonstrated. Then, a broadside circularly co-polarized wideband monostatic four-element array is proposed. The developed approach incorporates simultaneous changes of the antennas’ feed polarity and beamformer network to have virtually similar transmitting and receiving broadside radiation patterns while theoretically eliminate the strong self-interference. This monostatic array is composed of four balun-fed two-arm Archimedean spiral antennas. The operational principles are discussed for the proposed arrays under ideal conditions and followed by computational and experimental results. Average measured isolation  $>35$  dB and VSWR  $<2$  are achieved over at least an octave bandwidth. Good quality transmitting and receiving co-polarized radiation patterns with high envelope correlation coefficient are obtained.