

Performance Evaluation of a Millimeter-Wave Phased Array Antenna Using Circularly Polarized Elements

Authors : Rawad Asfour, Salam Khamas, Edward A. Ball

Abstract : This paper is focused on the design of an mm-wave phased array. To date, linear polarization is adapted in the reported designs of phased arrays. However, linear polarization faces several well-known challenges. As such, an advanced design for phased array antennas is required that offers circularly polarized (CP) radiation. A feasible solution for achieving CP phased array antennas is proposed using open-circular loop antennas. To this end, a 3-element circular loop phased array antenna is designed to operate at 28GHz. In addition, the array ability to control the direction of the main lobe is investigated. The results show that the highest achievable field of view (FOV) is 100°, i.e., 50° to the left and 50° to the right-hand side directions. The results are achieved with a CP bandwidth of 15%. Furthermore, the results demonstrate that a high broadside gain of circa 11 dBi can be achieved for the steered beam. Besides, a radiation efficiency of 97 % can also be achieved based on the proposed design.

Keywords : loop antenna, phased array, beam steering, wide bandwidth, circular polarization, CST

Conference Title : ICCEA 2021 : International Conference on Computational Electromagnetics and Applications

Conference Location : Rome, Italy

Conference Dates : July 22-23, 2021