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Analysis of uniformity in steering capability of an ESPAR antenna

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Abstract

This paper looks at design considerations for an Electronically Steerable Parasitic Array Radiator (ESPAR) antenna suitable for inexpensive large-scale wireless network technologies. This can help address the demand for a cheaper, simpler, and low power alternative to fully adaptive antennas. We use simulations to consider the effect of the number of elements on the beam-forming and steering capabilities of an ESPAR antenna with a single ring of parasitic elements. Our results validated well against published results and provide the best possible gain over the parasitic element loads considered. It was also found that at least three parasitic elements are required to achieve a reasonably high maximum gain and deep nulls. Based on our results, a 10-element ESPAR offers the most continuous and uniform steering. In addition to smart low power applications, this advantage may be translated into improving the accuracy of triangulation for positioning, localisation, and navigation applications with ESPAR antennas.