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Title: A New Technique of FSS-Based Novel Chair-Shaped Compact MIMO Antenna to Enhance the Gain for Sub-6GHz 5G Applications

ABSTRACT This paper introduces a new compact Chair-shaped MIMO antenna with two radiating elements and a single layer of frequency-selective surface (FSS) for 5G Sub-6GHz communication systems. They use two techniques, Parasitic element, and (FSS), for isolation and gain enhancement, respectively. The 1 × 2 MIMO antenna using a coplanar waveguide (CPW) fed. Moreover, an FSS array structure consisting of (a 68-unit) Square-shaped structure with Circular Slot (SCS) shaped cells is employed using a new technique (Surround Technique) to enhance the gain and isolation between the elements of the MIMO antenna. The proposed MIMO antenna system is printed on a Rogers 4350B substrate with a thickness of 0.508 mm. The antenna's performance is evaluated using S-parameters, radiation properties, and MIMO characteristics. The MIMO antenna system works in the Sub 6-GHz 5G band, which ranges from 3 to 6 GHz. Adding the FSS layer enhances the MIMO's antenna gain to a peak measured gain of 7.96 dBi and it also improves the MIMO antenna's isolation. The performance metrics of the proposed MIMO antenna were also investigated, including measures values of ECC = 0.004, DG = 9.99 dB, CCL = 0.2 bit/s/Hz, MEG = -3.13 dBi, and TARC = > 0dB exhibits advantageous antenna characteristics. The observed radiation characteristics of the suggested MIMO antenna system indicate its suitability for the upcoming 5G communication systems.

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