ARECTANGULAR MICROSTRIP PATCH ARRAY ANTENNA USING METAMATERIAL TECHNIQUE

NORHIDAYATI BINTI CHE MAT
2011198957

Thesis is presented in partial fulfilment for the award of the
Master of Science in Telecommunication and Information Engineering
UNIVERSITI TEKNOLOGI MARA (UiTM)

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ABSTRACT

This paper presents on the design of 2x2 Rectangular Microstrip Patch Array Antenna with frequency at 4 GHz using metamaterial technique for wireless application. Metamaterial technique used to enhance the characteristic of antenna. Defected Ground Structure (DGS) one of the techniques used to contribute the metamaterial features to the antenna. The construction of circle DGS at ground plane contributes the metamaterial features to the array antenna. Rectangular array antenna without DGS and rectangular array antenna with DGS has been simulated, fabricated and measured. The both antenna was designed and simulated using Computer Simulation Technology (CST) Microwave Studio and both antenna were fabricated on FR-4 substrate with dielectric constant of 4.7, thickness of 1.6mm and tangent loss 0.019 respectively for comparison antenna performance purposes. The fabrications of the antenna were measured using Vector Network Analyzer (VNA). The performance of the simulated designed antenna was then compared between the both antennas in term of return loss, bandwidth, gain, radiation pattern and Voltage Standing Wave Ratio (VSWR). The comparison between rectangular array antenna without DGS and rectangular array antenna with DGS has been made and of course rectangular array antenna with DGS (known as Metamaterial antenna) proof that it is better than rectangular array antenna without DGS. The value of bandwidth for the array antenna with DGS is increased to 95%. The gain also increases 5% than array antenna without DGS. The frequency obtained from the VNA for array antenna with DGS is 4.046GHz with -23.392 dB for -10dB return loss. The change in frequency value between simulated and fabricated antenna were tested and concluded as the common factor with the count of losses and human error.

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