

**IMPROVE ANTENNA PERFORMANCES BY DGS  
TECHNIQUES**

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## ABSTRACT

This thesis presents the design of microstrip circular patch antenna with Defected Ground Structure (DGS) for wireless communication. Microstrip patch antenna is chosen from the several types of antenna because of simple, inexpensive and easy to fabricate. However, major disadvantages of this type of antenna are low performances in term of gain, VSWR, return loss, radiation pattern and bandwidth. The size of microstrip antenna also is not suitable for the wireless applications. For this purpose, Defected Ground Structure (DGS) is used to improve the performances of microstrip antenna. DGS means by modifying the ground plane metal to disturb the shielded current distribution depending on the dimension and shape of the defect. The interruption at the shielded current distribution will influence the current flow and the input impedance of the antenna. It also will control the excitation and electromagnetic waves propagating through the substrate layer. The proposed antenna has been simulated at 2.45 GHz frequency using Computer Simulation Tool (CST) Design Environment software. The substrate using Frame Retardant 4 (FR-4) with  $\epsilon_r = 4.7$  and thickness 0.8mm. Copper with thickness 0.035mm is used as a patch and ground. DGS with various sizes and shapes is build below the circular patch. The resultant antenna with DGS and without DGS was analyzed in term of return loss, bandwidth, gain, Voltage Standing Wave Ratio (VSWR), and radiation pattern. The fabricated antenna was then to be measured by Vector Network Analyzer (VNA) to carry out its  $S_{11}$  and VSWR result. The result from simulation and measurement will be compared.

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