

# Design and Development of Antenna Array Using Slots for Multiband Applications

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**Abstract**-Microstrip and slot combinations recommend a further level of freedom in the plan of microstrip patch antennas. Microstrip Antenna (MSA) by slots of benefit to generate bidirectional and unidirectional radiation patterns by means of reasonably high-quality bandwidth. Present work involves, the design and development of microstrip patch antenna array with several slots using Quarter wave feed is considered. It is replicated and analyzed in detail by means of Quarter wave feed network which is used for multiband applications in ISM frequency bands. To achieve this work HFSS is used and its fabrication is prepared by utilizing photolithography method devise by FR4 Epoxy-substrate. In this work the antenna parameters like gain, resonant frequency, reflection coefficient and VSWR are evaluated theoretically and deliberated by fabricating the prototype unit. The results are presented at the end.

**Keywords** — Gain, VSWR, Reflection coefficient, Microstrip Antenna, Slots, Inset Feed, Quarter wave feed and HFSS.

## Introduction

It is encouraged to estimate the bandwidth capacity can likewise be enhanced by loading suitable openings on the whole with transmitting edges of patch. In sensible appliances, narrow bandwidth is the first disadvantage of micro strip antenna. In excess of a couple of broadband strategies, for example, coplanar hole, coupled patches, utilization of thick air or froth substrate are utilized. By presenting multiple slots in patch antenna we are capable to check the impedance of micro strip antenna. The presentation of slots upsets the way of the current flow in patch as a consequence that bring dual band property in patch antenna. Micro strip patch antennas secure specific sorts of waves along the transmitted waves that incredibly decrease the exhibition of the radio wire. These defective waves which incredibly affect the exhibition of patch reception apparatuses are called surface waves. Different scope of opening shapes is accessible to satisfy the necessary transfer speed improvement. The stacking impact of space on the emanating patch prompts raise in the present circulation length which brings about bringing down essential reverberation recurrence [1-6]. The U sort of opening on the Micro strip patch is considered as a straightforward plan. The hypothesis of smaller scale strip space radio wire has advanced from opening reception apparatuses empowered by a strip line. These sorts of space antennas have been broadly talked about in the writing [7-15]. They have abundant promising highlights, yet they experience from undesired modes, for example, the equal plate mode energized between the ground planes of the strip line. Microstrip space antennas (MSAs) have the advantage of having the option to create bidirectional and unidirectional radiation designs with enormous data transfer capacity. A mix of strip conductors and openings organized at the edges of a microstrip feed can create circularly captivated radiation [16-17]. The result of loading an annular slot has been considered analytically and experimentally by Morishita et al. [18]. The antenna characteristics like input impedance, resonance frequency, bandwidth, emission prototype and divergence have been studied as a function of the position of a slot opening. The single element with several slots and antenna array (2 elements & 4 elements) are considered by using quarter feed networks for multiband applications are presented in this paper.

## Feed Networks for Patch Antenna Array

In array manufacturing, feed network plan is crucial. Feed network utilizes an array for controlling the phase and amplitude of radiating elements for beam scanning properties controlling. [19-20]. Here for optimizing and selecting the feed network design array which is critical diverse types of feed networks are series feed, parallel feed, series-parallel, T-Split power divider, Quarter wave transformer, Mitered bend feed and Wilkinson power divider.

### 2.1 Quarter Wave Transformer

Here the transmission line like micro strip, and coaxial cables are used for designing of feed networks for effective power transmission through feed network., The Impedance matching is extremely important. The