

# Comparison between (1cross2) and (1cross4) Micro strip Patch Antenna Array of Triangular Patch

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**Abstract**—This paper describes comparison between (1cross 2) and (1 cross 4) microstrip patch antenna array of triangular patch. (1cross 2) Antenna array achieves high gain 5.8dBi at frequency 2.68 GHz , while that (1cross 4) Antenna array achieves high gain 8.8dBi at frequency 2.68 Ghz. This antenna utilized dielectric substrate which has dielectric constant 4.4 and thickness 1.6mm. (1cross 2) antenna show percentages bandwidth 8.4 and it offer gain 5.8dBi while that (1cross 4) antenna show percentages bandwidth 6.8 and it offer gain 8.8dBi, directivity 11.5dBi and antenna efficiency 58% at resonant frequency 2.68 GHz. So this micro strip patches antenna arrays of triangular patch for Wi-MAX.

**Keywords:** Micro strip Patch Antenna, Antenna array, WiMAX

## I. INTRODUCTION

In the field of wireless communication micro strip patch Antenna plays a vital role. Micro strip patch antenna show various advantages for low profile communication system like low cost, low weight, flexibility and ease of integration with active devices. For monolithic microwave integrated circuit micro strip patch antenna show a good solution.

Micro strip patch antenna show some limitation like low bandwidth, low gain and it cannot process multiband .so for overcome this limitation many type of miniaturization technique ,like utilizing high dielectric substrate , applying reactive and resistive load and increasing the electrical length of antenna have been proposed and utilized[1]. .

Microstrip patch antenna array is a good solution to obtain high gain result. Microstrip patch antenna increases its overall geometrical size as comparison microstrip patch antenna. Gain is increased while that bandwidth is decreased of microstrip patch antenna array. Microstrip patch antenna array structure has various disadvantages like large size[2].

In the present work, Microstrip patch antenna array is taken of triangular patch for high gain by collection of triangular patch and different feeding [3]. The substrate material play very important role in deciding the size and bandwidth of antenna [4]. For given antenna glass epoxy substrate utilized which has the dielectric constant 4.4 and the thickness of dielectric is 1.6mm. [5]

## II. ANTENNA DESIGN CONSIDERATION

Table 1 shown all specification for designing of microstrip patch antenna array.

S.N.	Parameters	Value
1.	Design resonance frequency	2.68GHz
2.	Dielectric constant	4.4
3.	Substrate height	1.6mm
4.	Patch length	25mm

5.	Patch width	32mm
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Table 1: Antenna parameter specification

The design of of microstrip patch antenna array is shown in Fig 1. The length and width of triangular patch are taken 25mm and 32mm. For ground plane we utilized glass epoxy substrate which has dielectric constant 4.4 and height of plane 1.6mm. The resonant frequency of antenna is 2.68 GHz. Probe feed technique is used for feeding the antenna [5]. Coordinate of first vertex of first patch is (0, 0)

A. (1 Cross 2) Array:

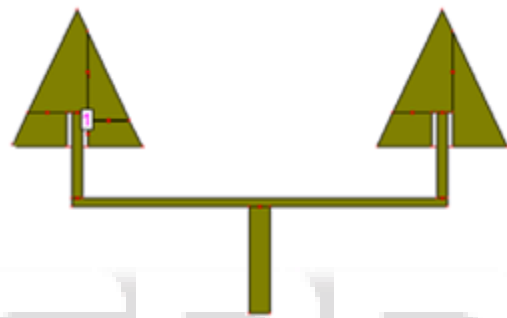


Fig. 1: (1 cross 2) array Feeding point = (14.5, 6) in mm

B. Bandwidth Vs Frequency:

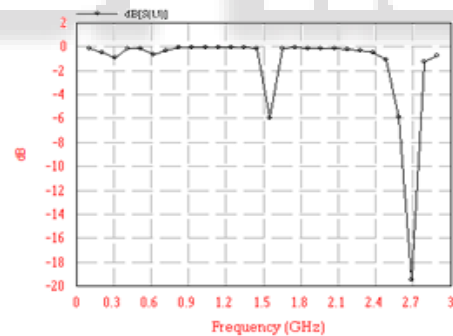


Fig. 2: Bandwidth Vs frequency

C. Gain vs. Frequency:

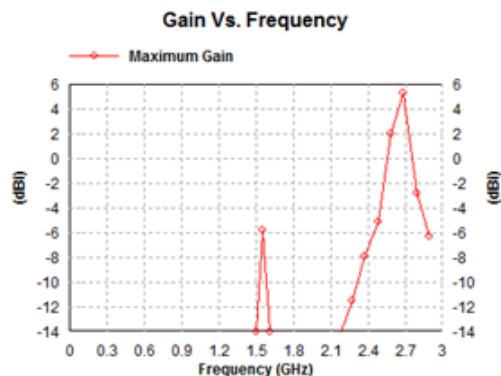


Fig. 3: Gain vs. Frequency

D. (1 Cross 4) Array:

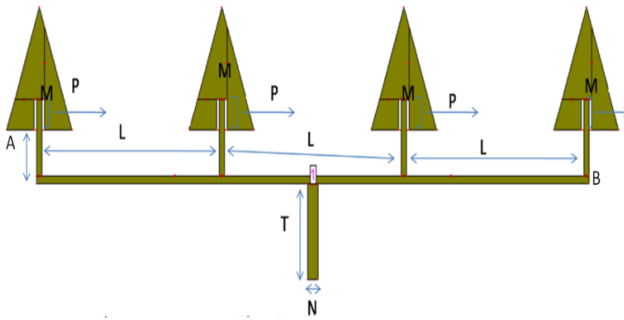


Fig. 4: Geometry of Microstrip Patch Antenna Array

- A=12mm
- B=2mm
- L =68mm
- M=4mm
- P=8mm
- N=4mm
- T=25mm
- Feeding point = (117.5,-12) in mm.

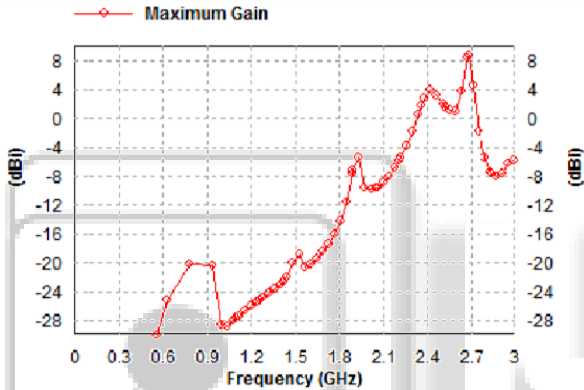


Fig. 5: Gain vs. Frequency

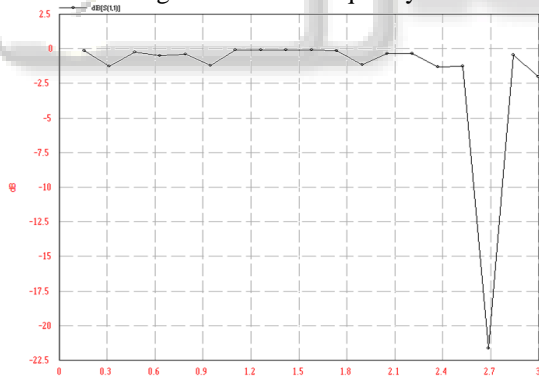


Fig. 6: Bandwidth Vs frequency

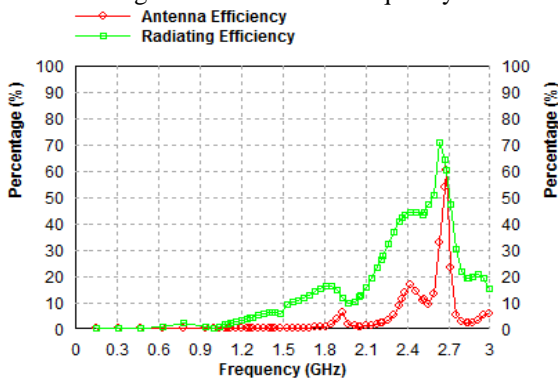


Fig. 7: Efficiency vs. Frequency

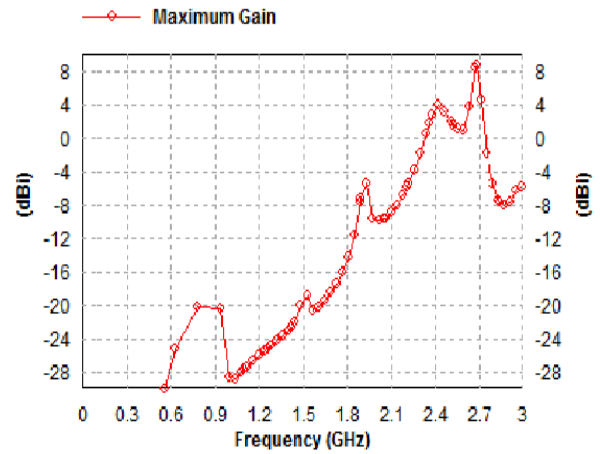


Fig. 8: Gain vs. Frequency

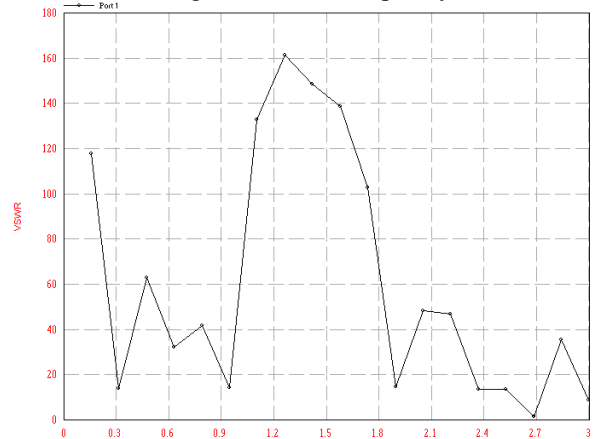


Fig. 9: VSWR Vs frequency  
Directivity Vs. Frequency

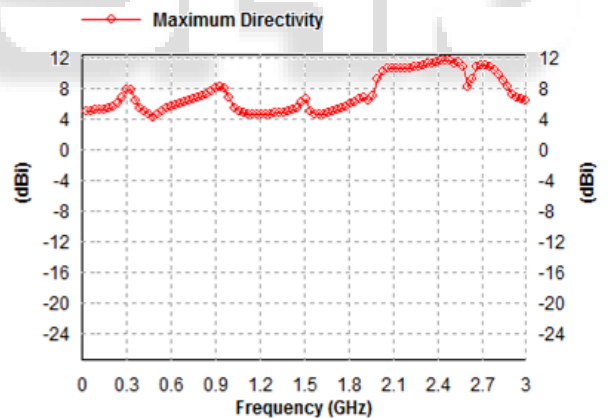


Fig. 10: Directivity vs. Frequency

III. SIMULATION RESULT AND DISCUSSION

Microstrip patch antenna array of triangular patch for Wi-MAX application simulated and analyzed by using IE3D software version 9.0 which is resonated at frequency 2.68 GHz . The gain of (1 cross2) microstrip patch antenna array is 5.8dbi while that the gain of(1 cross 4) microstrip patch antenna array is 8.8dbi and the antenna efficiency of microstrip patch antenna array is found to be 58%. The microstrip patch antenna array offer bandwidth is 6.8% and directivity 11.5 dBi .VSWR of microstrip patch antenna array is in between 1 and 2 over entire frequency band.

ARRAY	RESONANCE FREQUENCY (GHZ)	RETURN LOSS (db)	BANDWIDTH	GAIN (dbi)
1*2	2.68	19.6	8.4%	5.8
1*4	2.68	21.4	6.8%	8.8

Table 2: Simulation Result

#### IV. CONCLUSION

The characteristic of microstrip patch antenna array of triangular patch studied through by IE3D simulation software. It is found that gain can be increased by using array of triangular patch.(1 cross 2) microstrip patch antenna array has gain 5.8 dbi at 2.68 GHz and (1cross 4) microstrip patch antenna array has high gain 8.8 dbi at 2.68 GHz frequency and antenna cover the frequency range of 2.58 GHz to 2.75GHz which is suitable for WiMAX application[5]. It is found that microstrip patch antenna array provides high gain.

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