



# Survey of Reconfigurable Patch antenna for S and C Band Wireless Application

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**ABSTRACT:** Advancement in wireless communication is growing rapidly. S and C band have wide application in current scenario. Antenna design and analysis is must to meet this re-quirement. Frequency reconfigurable microstrip patches antenna uses for multiband application due to its dual model operation. Such antenna works in ON and OFF mode using electronics switches or diode. In this paper, reconfigurable microstrip patch antennas and their classification are described.

**KEYWORDS:** S & C band, Microstrip Antenna, Reconfigurable, Frequency, Polarization, Radiation Pattern.

## I. INTRODUCTION

Today it is need to reconfigurable, enormous bandwidth, and wideband antennas to fulfill the expanding requests for remote correspondence applications. Reconfigurable antenna method gives the capacity to adjust radiation pattern, polarization, working frequency and blend of these at least two parameters in an antenna, which is unimaginable with traditional antennas. For present day remote applications reconfigurability has become a significant component. By reconfiguring the antenna we can widely diminish the equipment unpredictability, size and cost of correspondence frameworks[2]. Multiband activity can be accomplished by changing the present ways on antenna. Current ways can be modified by changing the conditions of PIN diodes or MEMS switches. Varactor diodes utilized as switches on opened antenna to get the reconfigurability work for multi-standard individual correspondence frameworks. Reconfigurable opened fix antenna exhibited for L-band frequency area, where the working frequency fluctuates as the edge of direction of the opened segment shifts however this plan has restricted multiband activity.

Reconfigurable microstrip fix antennas are broadly utilized in the present remote correspondence frameworks because of their planar structure, low profile, minimal effort, lightweight, and the simplicity of manufacture. Switches are put in the structure to change the radiator shape, by which the radiation from the fix is controlled, and subsequently, reconfigurability is accomplished. Numerous cutting edge correspondence framework applications require diverse frequency groups with various polarization qualities[8]. Multifunction antennas have gotten a great deal of consideration lately in light of the fact that these antennas can give numerous administrations and spread different frequency groups with various radiation attributes. In any case, the utilization of carrier aggregation (CA) has been proposed in present day remote frameworks, for example, LTE and 5G.

The next generation mobile communication provides various advance application with high quality of services. The research is continuing going on 5G network communications applications. The antenna is key element of any communication devices. The expectation from 5G antenna is to meet the higher speed, low latency and large bandwidth. An antenna array is a set of multiple connected antennas which work together as a single antenna, to transmit or receive radio waves. Microstrip Patch Antenna (MPA) is array design is also very emerging research area for 5th generation communication application [12].

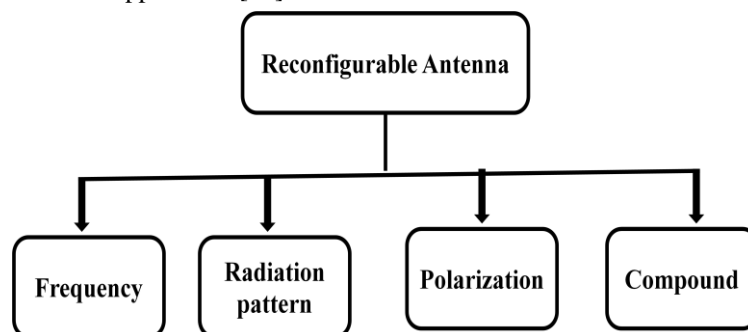


Figure 1: Types of Reconfigurable Antennas



## II. BACKGROUND

**B. Feng et al., [1]** An epic magneto-electric dipole antenna with wide H - plane beamwidth, triple-direct polarization and frequency reconfiguration is proposed for 5G interchanges. In this investigation, the transmitted dipoles are planned with the circular segment formed planes to display wide H - plane execution. A bowed cross-dipole feed with PIN diodes and varactor diodes embedded into its four arms at various heights is used to energize and control the antenna. Thusly, a deliberate wide beamwidth extending from  $-67^\circ$  to  $67^\circ$  can be accomplished in H - plane. What's more, the stature of the proposed antenna diminished about 30% because of the twisted structures. At last, by controlling the PIN diodes and varactor diodes, the three sorts of direct polarisations and frequency reconfiguration functionalities for 2G/3G/LTE/5G applications can likewise be effectively acquired. With the previously mentioned highlights, the proposed antenna well suits for astute base-station correspondences.

**H. T. Chattha, et al., [2]** A frequency reconfigurable printed microstrip-encouraged fix antenna is proposed here. The antenna comprises of a microstrip feed associated with a round emanating component isolated into three patches which are associated through silicon PIN diodes utilized as switches for accomplishing reconfigurability as being modest and simple to execute having high exchanging abilities. The spaces of various shapes are carved out in all the three patches to cover all pre-owned remote neighborhood (WLAN) frequency groups, including 2.4, 3.6, 4.9, 5.1, and 5.9 GHz. An inclination tee is planned and associated with give a DC predisposition to the PIN diodes. A model of the reconfigurable antenna is created and estimated alongside the predisposition tee. The deliberate and mimicked results are found in acceptable understanding.

**M. Tang et al., [3]** An electrically little, low profile, planar, Huygens dipole antenna with four reconfigurable polarization states is exhibited. The structure joins both electric and attractive close field thunderous parasitic components and a reconfigurable driven component. The four polarization states incorporate two symmetrical straight enraptured (LP) and two roundabout polarization (LHCP and RHCP) states. A 1.5 GHz model was created (halfway with 3-D added substance fabricating), gathered, and tried. The deliberate outcomes, in great concurrence with their mimicked qualities, show that even with its basic setup, electrically little size ( $ka = 0.944$ ), and low-profile tallness ( $0.0449\lambda_0$ ), this reconfigurable Huygens antenna has stable broadside radiation execution in the entirety of its four polarization states. The deliberate outcomes exhibit that in its x(y)- LP express, the pinnacle acknowledged addition, front-to-back proportion, and radiation productivity esteems are, individually,  $\sim 3.03$  dBi (2.97 dBi),  $\sim 10.7$  dB (9.9 dB), and  $\sim 68.2\%$  (67.5%). For the LHCP (RHCP) states, they are, separately,  $\sim 2.82$  dBi (2.74 dBi),  $\sim 11.4$  dB (12.5 dB), and  $\sim 67.1\%$  (65.9%).

**C. Borda-Fortuny, et al., [4]** A liquid switch is proposed for a frequency-lithe Vivaldi antenna whose working frequency band can be exchanged between two chose groups. An investigation of different ionized arrangements of various fixations is performed. A 2 mol KCl arrangement is chosen as the liquid for the switch in view of its generally great properties in conductivity, relative permittivity, and misfortune digression. The liquid exchanged reconfigurable Vivaldi antenna can work well between two client characterized working groups: 3.2 and 4.5 GHz with stable estimated increase of 11 dBi in the two groups and a separation of 15 dB. This reconfigurable antenna shows that a minimal effort liquid switch might be an elective gadget for reconfigurable antenna plans giving greater adaptability.

**C. Mama et al., [5]** Diffractive antennas actualize steerable bars dependent on reconfigurable diffractive gadgets, for example, Fresnel zone plates (FZPs). Contrasted and staged cluster frameworks, FZP antennas have compact designs and straightforward shaft directing instruments. In this Letter, the creators show a FZP-based reconfigurable diffractive antenna with three degrees of opportunity (3DoF), for example concurrent reconfigurable directing edge, beamwidth and working frequency. Such a profoundly reconfigurable antenna is actualized dependent on a solitary layer metasurface mounted with microwave varactors. The standard behind this 3DoF reconfiguration is the electrically incited straightforwardness and murkiness exchanged by various arrangements of twofold voltages applied over the varactors. Exploratory estimations approved the proposed approach.

**H. Thi Phuong Thao et al., [6]** This examination proposes a solitary frequency reconfigurable planar alter F antenna (FRPIFA) utilizing PIN diodes dependent on the progressions of shorting pin positions. The single FRPIFA works in four designs which spread the groups of GSM 900/GSM 850, GPS 1575, GSM 1800/GSM 1900 and UMTS (General Versatile Media transmission Framework) with top additions of - 7.24, 2.30, 2.98 and 3.53 dBi, separately. Besides, a frequency reconfigurable numerous info different yield (MIMO) antenna comprising of two single reconfigurable ones with a separation of half-wavelength is exhibited. By exchanging the PIN diodes, the reconfigurable MIMO antenna acquires four unique designs. For MIMO antenna, aftereffects of the working groups, gains, radiation patterns are like those of the reconfigurable single one. The MIMO antenna accomplishes a high separation with  $|S_{21}|$  not exactly - 20 dB in every single working band. The mimicked consequences of S-parameters of the antennas are in acceptable concurrence with estimations. The proposed conservative single and MIMO antennas are reasonable for green keen remote correspondence frameworks.

**R. Persico, et al., [7]** This work proposes another method for the alleviation of narrowband obstructions by utilizing an inventive ventured frequency Ground Entering Radar (GPR) framework, in light of the balance of the coordination time of the consonant parts of the sign. This can permit a decent dismissal of the impedance signal without sifting through



piece of the band of the valuable sign (which would include lost data) and without expanding the intensity of the transmitted sign (which may immerse the recipient and make illicit the degree of transmitted force). The value paid for this is an augmentation of the time required so as to play out the estimations. it is will show that this vital downside can be contained by utilizing a prototypal reconfigurable ventured frequency GPR framework.

**L. Xing, et al., [8]** A ultra-reduced water stacked, 3D reconfigurable antenna is exhibited for computerized video broadcasting-handheld (DVB-H) and ultra-high frequency (UHF) applications. By incorporating a varactor diode, the working frequency of this antenna can be persistently tuned from 463 to 900 MHz. A blend of the water and water holder is viably used as a dielectric stacking to decrease the size of the antenna by half. The emanating component possesses a conservative volume ( $0.013 \lambda \times 0.016 \lambda \times 0.005 \lambda$  at 470 MHz). Estimations are directed to qualify and approve the antenna execution. It is shown this new antenna is an astounding contender for UHF and DVB-H applications.

**R. Tiwari [9]** A research on Antenna design and simulation is a emerging area among researchers. Antenna is a basic element for wireless communication. There are various shaps and types of antenna, which uses in different allpication. Now a days Microstrip patch anteena is very useful in advance electronics devices applications. This paper focused on study based various types of microstrip antenna. Return loss, VSWR, bandwidth, resonant frequency and gain is key parameters to judge antenna performance.

. Table 1: Summery of Literature Survey

Sr No.	Author Name & year	Proposed Work	Outcome
1	Bilal Ijaz, 2018	Dual-Band Monopole Antenna	Resonant frequency 3.66GHz and 4.56 GHz
2	H. T. Chattha, 2018	polarisation reconfigurable antenna	Impedance bandwidth of 2.09-2.96 GHz
3	C. Borda-Fortuny, 2017	compact reconfigurable monopole antenna	On- 2.45 GHz and 5.4GHz Off- 2.49–3.84 GHz
4	C. Ma, 2016	circularly polarized antenna	1-dB AR beamwidth of up to 83°.
5	H. Thi, 2015	Frequency reconfigurable antenna	Peak gains of -7.24, 2.30, 2.98 and 3.53 dBi

### III. TYPES OF ANTENNA RECONFIGURATION

Reconfigurable antennas can be ordered by the antenna parameter that is powerfully balanced, commonly the frequency of activity, radiation pattern or polarization.

#### i. Frequency reconfiguration

Frequency reconfigurable antennas can change their frequency of activity progressively. They are especially helpful in circumstances where a few correspondences frameworks merge on the grounds that the numerous antennas required can be supplanted by a solitary reconfigurable antenna. Frequency reconfiguration is for the most part accomplished by physical or electrical alterations to the antenna measurements utilizing RF-switches, impedance stacking or reasonable materials.

#### ii Radiation pattern reconfiguration

Radiation pattern reconfigurability depends on the purposeful alteration of the circular dispersion of the radiation pattern. Bar guiding is the most expanded application and comprises of controlling the course of greatest radiation to augment the antenna gain in a connection with cell phones. Pattern reconfigurable antennas are typically planned utilizing mobile/rotatable structures or switchable and responsively stacked parasitic components. Over the most recent 10 years, metamaterial-based reconfigurable antennas have picked up consideration due their little structure factor, wide pillar controlling reach and wireless applications.

#### iii Polarization reconfiguration

Polarization reconfigurable antennas are equipped for switching between various polarization modes. The ability of switching between flat, vertical and roundabout polarizations can be utilized to decrease polarization jumble misfortunes in compact gadgets. Polarization reconfigurability can be given by changing the harmony between the various methods of a multimode structure.



iv Compound reconfiguration

Compound reconfiguration is the ability of at the same time tuning a few antenna parameters, for example frequency and radiation pattern. The most widely recognized application of compound reconfiguration is the blend of frequency deftness and shaft examining to give improved ghashly efficiencies. Compound reconfigurability is accomplished by joining in a similar structure distinctive single-parameter reconfiguration systems or by reshaping powerfully a pixel surface.

v. Switching Components & Application

PIN Diodes – fundamental switching components used to change the RF current stream in the circuit. It has the preferences that ease, simple to manufacture, quick switching reaction, and dependable. PIN diode has just a single disadvantage that it has high DC predisposition current. A point by point discourse about different configurability and overview of different reconfigurable antennas are talked about in the up and coming areas of the paper.

Varactor Diodes – it has the preferred position that the present move through varactor diode is little when contrasted with PIN diode. The disadvantage is that varactor diodes are nonlinear and low powerful range.

MEMs – it has a more prominent favorable position that low power misfortune and inclusion misfortune. The downside is that moderate switching speed and has complex creation.

Applications-

- Pattern Reconfigurable Antenna for MIMO System
- Reconfigurable monopole antennas for WLAN\WIMAX application
- Frequency Reconfigurable Antenna for a Cognitive Radio Application

Reconfigurable Antennas for Satellite Applications

#### IV. CONCLUSION

Reconfigurable antennas are more effective than all other antenna strategies since single antenna can be worked with various modes. It is reasonable for single antenna with multi-use applications or clients to utilize. It furnishes progressively proficient correspondence with least expense. The attributes and arrangements of reconfigurable antenna have been exhibited in this paper. As another idea of antenna, reconfigurable antenna appreciates extraordinary worth and great prospects. For structuring and reproducing of reconfigurable antenna, CST Microwave Studio (CST MWS)-2018 device can be utilized.

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