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Overlay Cognitive Radio Using MIMO Reconfigurable Filtenna

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A B S T R A C T

Overlay cognitive radio is described in this paper. Channel activity is endlessly guide by the Wide band sensing antenna and a reconfigurable filtenna need to change the performing frequency. MIMO antenna system is considered to reduce multipath fading and to improve channel capacity. MIMO reconfigurable filtenna is designed and simulated using HFSS software. Sensing antenna covers the frequency range 3-10 GHz and reconfigurable filtenna used to transform wideband response to narrowband which is suitable for cognitive radio system.

Keywords: Band Pass Filter, Reconfigurable filtenna, MIMO and Cognitive radio.

1. Introduction

The progressing of new powerful range apportioning ways to deal with enhance achievement of the present range in light of the fact that the present radio range is constrained and administration causes its utilization inadequate. The fellowship affiliation interfaces intellectual radio to powerful range allocation and dispersion.

In the overlay state of activity, a detecting receiving wire course of action is requested to control about the range openness. Imparting reception apparatus game plan required to change the performing recurrence suitably. Henceforth, in an overlay framework, there are two sorts of end clients: the clients who inborn the range, are essential clients along with they can get to the channel at whatever point they need and the optional clients who can get to the channel when prime clients are missing. There is no restriction on communicating control for Primary clients however the auxiliary clients ought to pass on without making any interruption with as of now show range claimed clients.

The amalgamation of channel and receiving wire is called Filtenna. The hindering accessories of the biasing lines are discouraged by utilizing filtennas and the receiving wire shaft limits are not diverted. Famously amid evanish conditions, MIMO arrangements of the filtennas are allowed for competence and reliability of the in channel.

2. ANTENNA DESIGN AND CONFIGURATION

Band pass filter configuration

A bandpass filter is an electronic device or circuit that allows signals between two specific frequencies to pass, but that discriminates against signals at other frequencies. Bandpass filters are widely used in wireless transmitters and receivers. The main function of such a filter in a transmitter is to limit the bandwidth of the output signal to the band allocated for the transmission. This prevents the transmitter from interfering with other stations. In a receiver, a band pass filter allows signals within a selected range of frequencies to be heard or decoded, while preventing signals at unwanted frequencies from getting through. A bandpass filter also optimizes the signal-to-noise ratio and sensitivity of a receiver. The channel is urged a Rogers Duroid 5880 substrate with a dielectric consistent of 2.2 and a stature of 1.6mm.

Equivalent Circuit

The abandoned microstrip structure of band pass channel can be communicated as far as lumped components utilizing ADS appeared in figure 1. The capacitance and inductance qualities are acquired by

$$Lp = \frac{z_0}{\pi(f_2 - f_1)} \rightarrow [1]$$

$$Cp = \frac{(f_2 - f_1)}{4\pi f_2 f_1 z_0} \rightarrow [2]$$

$$Ls = \frac{z_0(f_2 - f_1)}{4\pi f_2 f_1} \rightarrow [3]$$

$$Cs = \frac{1}{\pi z_0 (f_2 - f_1)} \rightarrow [4]$$

The gaps in HFSS are represented as Ls (inductor) and Cs (capacitor) in ADS.

Fig. 1. Band Pass Filter Layout

The diodes are supplanted by the fix since the apparatus does not have an alternative to embed a diode so we can either supplant it by a fix or rather we can give the capacitance and resistance esteem for a sheet with RLC limits which goes about as like that of diodes exchanging operations. At the upper also, bring down edge two separate diodes are utilized. Accordingly each side two sets of diodes and are spoken to as {D1, D2, D3, D4}.

Overlay Antenna Design Configuration

To permit the optional clients to contact the channel, reconfigurable filtenna structure is outlined. Another radio wire structure intended to constantly screen the range.

Consequently there are two transmitting courses of action performing at the same time. Figure 4 demonstrates the physical course of action of the radio wire. Two ports for detecting radio wire and other two ports for reconfigurable filtenna, in this manner there are four ports. Add up to measurement of the radio wire is 80mm ×90mm.The transmitting patch of two detecting radio wire is roundabout fix. Reconfigurable radio wire is a fix finished with a roundabout form shape to decrease the span of the filtenna.

Sensing Antenna

$$a = F\{1 + \frac{2h}{\pi F \varepsilon_r}\,[\ln(\pi F/2) + 1.7726]\}^{-\frac{1}{2}}$$

Where

$$F = \frac{8.791\times10^{9}}{f_r\sqrt{\varepsilon_r}}$$

3. EXPERIMENTAL RESULT

Band pass filter using ADS

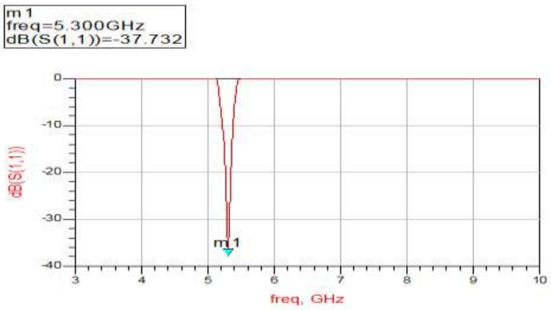

Fig. 2. Returns loss when D1 & D2 ON

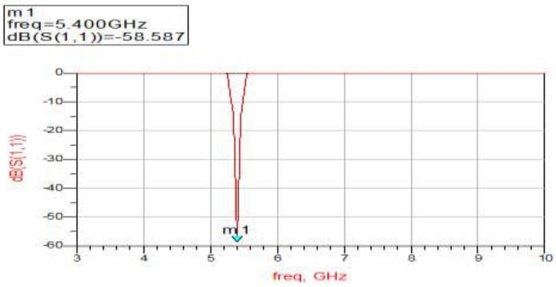

Fig. 3. Returns loss when D3 & D4 ON

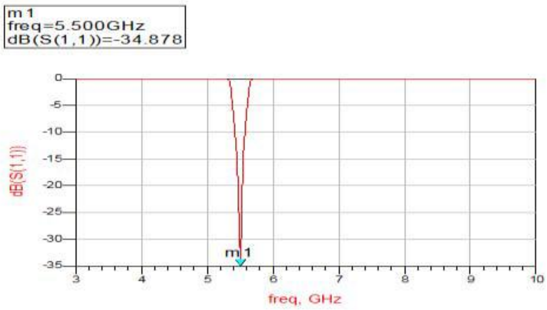

Fig. 4. Returns loss when all diodes ON

Fig. 5. 3D Radiation pattern when all diodes are off

4. CONCLUSION

In this paper, reconfigurability is accomplished by exchanging between the diverse diodes. It gives a decent pick up of 5.8 dB, VSWR is under 2 and for the whole frequency extend return misfortune is more prominent than 10dB which is attractive if there should be an occurrence of reception apparatus plan. Reconciliation of channel in the nourishing some portion of the reception apparatus builds the pickup and limits the changes in the emanating part.

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