MAMRN- MIMO ANTENNA MAGNETIC FIELD REDUCTION USING SIGNAL TO NOISE DETECTION IN WIRELESS DEVICES

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Abstract

Electromagnetic radiation (ER) is the method of producing energy from an antenna. ER can be at different frequencies excluding zero, although ER at different frequencies may take different forms. In several antenna configurations are often feasible to calculate the current sharing with adequate correctness to gain high-quality calculation of radiated areas. With the aim of determining the impedance possessions of an antenna, the present sharing is essential to identify with advanced accuracy by selecting shorter signal strength or by minimizing the contact extents of the base station (BS) to avoid ER. Current mobiles build with the multiple antennas thus, increases the effects of high ER. We present an improved realistic signal dispensation method based on the artificial array perception applied to maintain location information to improve signal strength detection and restriction estimation in multi-antenna environments. The device maintains an array to update the signals through one or more antennas along a random spatial route. The protocol designed for the multi-antenna diversity signal processing to enhance signal strength detection in dense environments with the angle of arrival (AOA) computation, environmental fading and signal reduction computed by the fuzzy logic inference (FLI) system. Communication diversity is used to minimize fading limitations and to improve the signal discovery.

1. Introduction

Initial wireless radio (WR) signals communications had a very restricted coverage. Signal propagation[9]. Propagating waves is related to radiance impression but they differ from numerous aspects. There are several outside situations that involve a signal such as environmental conditions. In signal processing, there is an emitter region that deploys the way and passes through air media. Multiple antennas generate a series of fluctuation signals with particular frequencies and signal lengths. The electromagnetic signals pass away from the multiple antennas up to remoteness where the force is fully damp through the surroundings. Improve device design in wireless infrastructure will minimize the effect of transmitted ER. Antennas can build in any communication products like medical observation instruments, wireless cars, smart houses, elegant meters, mobile phones, laptops and so on. During the design and connection to detain valuable information change, deploy as well improve new and existing connection services.

Depends on the additional growth of transmission and receiving needs, the mobile design with multiple antennas and enough of base station placement is necessary and unavoidable. Some major issues go around the world that has an observer of the placements of base stations for the use of antennas as infrastructure. This resistance may be concurrent to anxieties about possible physical condition risks source by the contact to magnetic force as unnoticeable and indefinite health issue can arise. This unawareness can result in common conflicts and this may lead to slow down the growth of wireless device usages. In this proposed model fuzzy logic inference based decision developed for multiple antenna minimal radiation communication and minimum signal strength based MIMO antenna usage tested to improve the bits per second. The Fuzzy inference is well right for complex and nonlinear techniques where human information can be operated. Fuzzy inference has been fruitfully applied in a variety of vicinities of wireless operations. In fuzzy inference include the parameters as frequencies, antenna signal capacity, and signal to noise ratio, MIMO probability, and rates of error.

The rest of the paper arranged as, in section II, it explains the available research literature review, section III speaks about the MAMRN methodology to control the radiation, results and its validation explained in section IV, the final conclusion is specified in section V.

2. Literature Review

SAS allows the energy to be transmitted or received in a particular direction as opposed to disseminating energy in all directions this helps in achieving significant spatial re-use and thereby increasing the capacity of the network [4].Large-scale effects involve the variation of the mean received signal strength over large distances or long time intervals, whereas small-scale effects involve the fluctuation of the received signal strength[1]. The impact of mobile phone radiations on human body, only a few consider the effect of the human exposure to base stations although such an effect may be greater as more body parts can absorb RF energy[6]. To meet the requirements of the next generation wireless communications, a system capable of automatically changing the directionality of its radiation patterns (beams) in response to its signal environment[2].Mobile communicates in radio frequency range of electromagnetic spectrum, which is a non-ionizing radiation. Radiation in general, means the process through which energy in the form of particles or waves is transmitted[8]. Micro-strip antennas are arranged in an array to overcome the individual low gain limitation, especially for the applications that require high gain and high directivity. Mutual coupling between elements of an array adversely affects the radiation characteristics and the overall system performances[5]. In mobile phone usage, possible health risks related to RF exposure have become the subject of considerable attention. This includes effect from exposure to both cell phones and base stations[7]. The multipath effect, we utilize the space-alternating generalized expectation- maximization (SAGE). The algorithm to recursively detect the direct propagation angle, where the polynomial rooting is exploited for computational efficiency[3].

3. MAMRN Implementation

3.1 Fuzzy Inference Based MIMO Antenna Control System

Present implementations proposed that the presentation of linear monitors powerfully depends on the signal receiving condition. Pathway condition has also been exposed to radically concern the reception of signal and base station distance based discovery and error outcome in MIMO. Magnetic field effect condition of MIMO antenna measures the reliance or association between antenna distances and distance among device and BS. Lower the volume of environmental condition, allows lowing the association between antenna distances and BS. This can impact on reducing communications and increasing the magnetic force in surrounding areas. In particular decibels independent signals, ideal state to attain utmost bits per second favorable state which facilitate elevated throughput as contrast to the single and multi-antenna, incase normal association which gives trivial throughput step-up, if association where MIMO would not be able to increase bits per second antenna reception. To get high bits per second of long-term evolution LTE downlink. When the antenna count is high, the receiving paths are highly associated so the MIMO antenna will not increase the bits per second therefore, the excellence of MIMO antenna plays a very important position to optimize the bits per second of LTE antenna device.

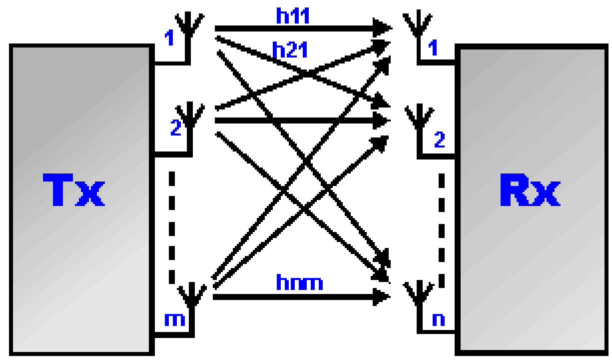

Figure 1. MIMO Antenna communication

MIMO antenna communication delivers important capability gains as compared with the traditional single antenna. In a communication System with TA sending antennas, and *RA* receiving antennas, the outcome and capability of transmissions are defined as

$$AT \begin{cases} AA^* & RA < TA \\ A^*A & RA > TA \end{cases}$$

Where A is the antenna table of MIMO antenna gain designed as Gaussian. MIMO antenna association table AT is known as antenna association table**.** The value sharing's and determinate settings table have been broadly checked to explore the capacity of the MIMO antenna under diverse situations. The values of AD is specified as

A = [A1, A2,An]

with A1 > A2.. > An.

Computation of AT is mentioned as:

$$AT = \frac{ATMax}{ATMin}$$

Where ATMaxand ATMinare the smallest and highest values of AT, in order, antenna state is a metric which decides the predictability of a table. A state near to one specifies a good trained -grade table with equivalent values, whereas an extremely high condition number entails a close grade lacking table. The impact of quantity on MIMO antenna ability assuming ideal antenna information at the receiver and no information at sender as

$$\text{Capacity} = \log 2 \frac{\text{SINR}}{2} \text{X AT}$$

The relation between antenna capacity with a static signal to noise ratio (SINR) and changing state effect is obvious that as the antenna state rises the MIMO antenna capability reduces. To go with clear increasing sharing purpose (ISP) and Probability compactness (PC) of MIMO antenna state analyzed.

Antenna capacity for the dissimilar output of SINR

- Update inputto select BS

-IfSINR is in feasible state, startFuzzification FN

-Convert inputs to FN outputsthrough membership functions (MF)

-Conclusion: Evaluate the set of laws

- Defuzzification:Productivityof the MIMO communication antenna to BS chosen

end

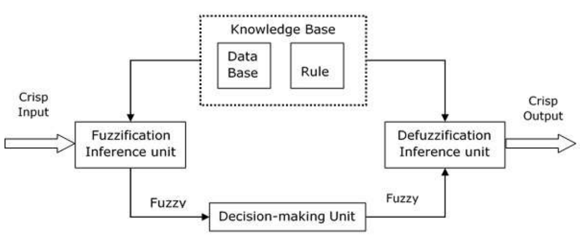

Figure 2. Fuzzy Execution

3.2 FN choice for MIMO antenna selection

FN is used for conclusion making and is talented of commerce with irrelevant parameters and indecision in the system. The decision in FN surroundings is a decision procedure in which the aims are FN in character. The purpose of the FN conclusion is to get a choice, best in the intelligence that a number of the set of goals are achieved, as watching set of limitations. The MIMO antenna transmission is non-uniform and incessantly time-changing in the environment. Hence, the antenna position and number of antennas receiving SINR are computed by fuzzy. The conclusion regarding controlling of MIMO antenna mode is completed by the FN. Knowledge about the antenna state, numbers of antennas (NA) and receiving SINR control the suitable MIMO antenna transmission.

This information can be spoken well in expressions of an FN using the law set. This information provides the inspiration for the plan and execution of FN conclusion for antenna BS selection without electromagnetic effect and without interference. The FN conclusion checked with inputs single output is intended for antenna changing. Antenna conditions, number of antennas and SINR from BS are considered as inputs and selection of BS is output result from FN conclusion is the reaction to a source with long-term evaluation (LTE) Links it chooses the suitable BS with high throughput. The FN conclusion handles fuzzificationlaw set formation, and defuzzification system. In FN the inputs given to FN conclusion that are rehabilitated into a collection of MFS values as [0, 1] in the matching sets. Somewhat go further than Triangular MFS are used for input variables.

During fuzzification AT, NA and SINR are given as inputs. These values are known to the fuzzification step by evaluating the margin range as high, standard and low values. The inputs are used to judge the present fuzzy laws and their output can be used to adjust the laws by a variety of blends of high, standard and low inputsacknowledgedfuzzy laws and the values are passed as input based on the MFS.

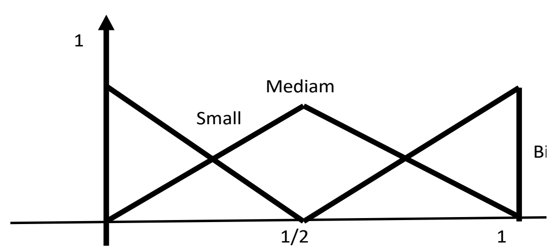

Figure 3. Fuzzy Membership Function

Given input parameters are considered as the triangular edger for 3 inputs. These inputs are calculated as subjective value and straight figure of inputs. The inputs which are typically MFS of a fuzzy is $input1, input2$, $input3$and the weights are wa, wb, wc which has a an assessment total T in the range as [0, 1].

T = input1 x wa + input2 x wb + input3 x wc

The result R of the output as per the defuzzification computed value as

$$R = \frac{T}{\alpha}$$

For all accessible antennas and BS, the ultimate value is estimated and the best value is chosen for the current connection as a minimum magnetic effective destination.

4. Results and Discussion

The performance output shows in Figure 4, the device communication results which can imply the goodness of the protocol. In graph, packet delivery ratio (PDR) shows the improved values than the previous one. Due to optimized parameter analysis, even multiple antennas communicating at a time network show high PDR in MAMRN

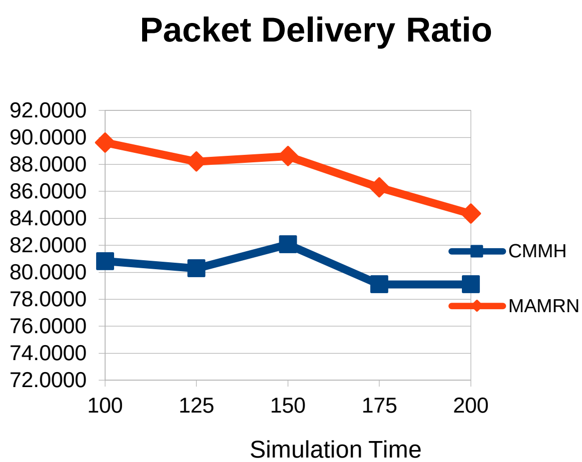

Figure 4. Packet Delivery Ratio Vs Simulation Time

Simulation Time	CMMH	MAMRN
100	80.8311	89.6197
125	80.2962	88.2106
150	82.074	88.6082
175	79.1117	86.2843
200	79.1117	84.3497

Table 1. Packet Delivery Ratio Vs Simulation Time

Received packet rates computed as throughput taken from bits per second received. MAMRN shows the high improved throughput than the previous protocol. If accurate tower selected by the device means without noise and interruption packets can move and it also controls the high radiation effect. Multiple devices with multiple antennas can be handled and communicate with minimum waves controls the radiation. The table1 shows the comparative analysis of results from percentage. Here, simulation times taken in seconds and the comparison shows CMMH as 80% for 100 seconds and the proposed MAMRN show 89.6% because of the optimized fuzzy parameter analysis.

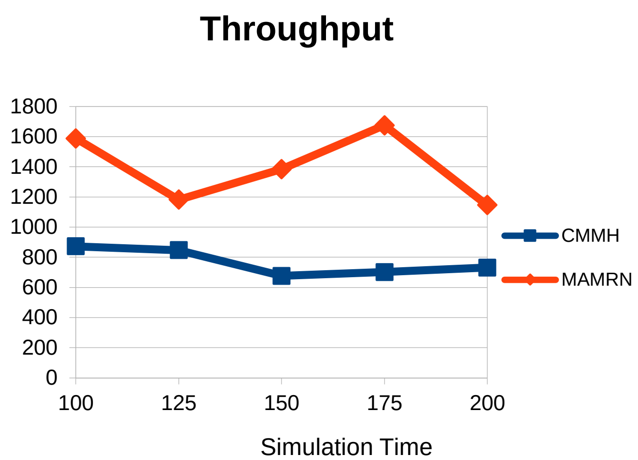

Figure 5. Throughput Vs Simulation Time

Simulation Time	CMMH	MAMRN
100	108072	119588
125	108437	118782
150	110676	119984
175	107201	116975
200	107201	114646

Table 2. Throughput Vs Simulation Time

Figure 5 shows the delay of maximum time taken to communicate with device to base station considered as a delay. It covers the processing time to find the proper base station and the complete packets handed over to base station from device or from base station to device. It means both uploading and downloading process. Table 2 shows the bits receiving per second by the devices when CMMH protocol runs the result as 108072 and in MAMRN the receiving bits per second as 119588 higher than the CMMH for 100 second simulation time and its increasing gradually when the simulation time increasing.

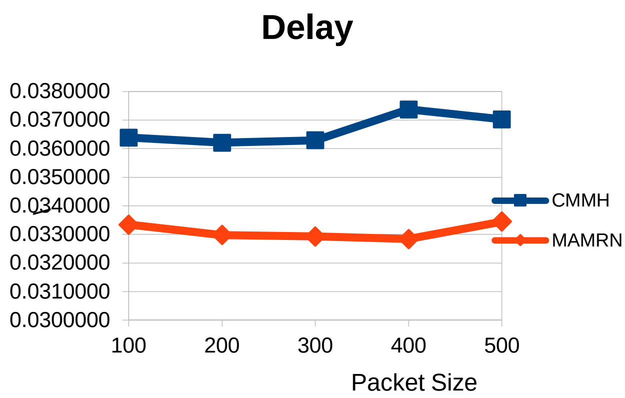

Figure 6. Delay Vs Packet Size

Packet Size	CMMH	MAMRN
100	0.00718687	0.00677695
125	0.00745857	0.00707428
150	0.00802938	0.00753947
175	0.0082186	0.00730867
200	0.0082186	0.00752308

Table3. Delay Vs Packet Size

Figure 6 shows the delay output compared with CMMH and MAMRN. Delay to consider the total time taken to reach the destination from sending device. It includes the delay of signal to noise ratio, signal weak due to strength. Depend on these metric also the delay can be changed. As shown the graph MAMRN results less delay than then CMMH. Due to fuzzy computation it gives less delay than the existing one as shown in table 3. By varying packet size as 100 bytes delay of CMMH is 0.00718687 and the MAMRN delay is 0.00677695

5. Conclusion

The explanation methodologies planned in this paper for the fuzzy-based radiation minimization organizer for mobile device communications using multiple antennas with long-term evaluation output guaranteed the radiation reduction, communication quality and noiseless connection to the users. By using fuzzy optimization mobile device selects the tower to get the minimized electromagnetic effect. Antenna distance, signal to noise ratio and signal strengths are considered to select the base station among multiple tower placements. The ultimate aim of this implementation is to minimize the radiation while large numbers of mobile devices communicating with multiple antennas. Performances of the new solution have been tested and are compared with the existing model. From this analysis, it can be fulfilled that the proposed fuzzy logic based mobile communication provides the best quality output than without optimized test bed.

References

[1] Theodore S. Rappaport, Keith Blankenship, HaoXu,“Propagation and Radio System Design Issues in Mobile Radio Systems for the GloMoProject”Bradley Department of Electrical and Computer Engineering Virginia Polytechnic Institute and State University,January 31, 1997.

[2] RameshwarKawitkar,“Issues in Deploying Smart Antennas in Mobile Radio Networks”International Journal of Electronics and Communication Engineering, Vol:2, No:5, 2008.

[3] Weile Zhang, Qinye Yin, Hongyang Chen, Member, IEEE, FeifeiGao, Member, IEEE, and Nirwan Ansari, Fellow, IEEE,“Distributed Angle Estimation for Localization in Wireless Sensor Networks”IEEE TRANSACTIONS ON WIRELESS COMMUNICATIONS, VOL. 12, NO. 2, FEBRUARY 2013.

[4] Mohammed A. Abdala and Areej K. Al-Zuhairy,“Integration of Smart Antenna System in Mobile Ad Hoc Networks”International Journal of Machine Learning and Computing, Vol. 3, No. 4, August 2013.

[5] Mohammad Tariqul Islam and Md. ShahidulAlam,“Design of High Impedance Electromagnetic Surfaces for Mutual Coupling Reduction in Patch Antenna Array”OPEN ACCESS materials ISSN 1996-1944 www.mdpi.com/journal/materials,2013.

[6] LalrintharaPachuau, LalrintluangaSailo, ZaithanzauvaPachuau& P C Lalngneia,“RF radiation from mobile phone towers and their effects on human body”Indian Journal of Radio & Space Physics,Vol 43, April 2014.

[7] LalrintharaPachuau, ZaithanzauvaPachuau,“Study of Cell Tower Radiation and its Health Hazards on human body”IOSR Journal of Applied Physics (IOSR-JAP), Volume 6, Issue 1, Jan. 2014.

[8] Akanksha Jain, Kamal Jain, Ajay Gairola,“Mobile tower radiation– Affects, Assessments and Monitoring of IIT RoorkeeCampus”International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), Volume 3 Issue 7, July 2014.

[9] S.Gayathiri, , R.Gokulapriya and V.S.Arulmurugan,” an improved channel aware smart grid transmission for manet” International Journal of Innovations in Scientific and Engineering Research (IJISER),

Vol 1, Issue 4, APR 2014.