Design a Program to Simulate the Active Antennas

Maha Abdul Ameer Kadhum

Abstract-In this research has been studying and analyzing some types of properties antennas normal, then been improved characteristics after conversion to efficient antennas with compared to the old characteristics of antennas and new characteristics which distinguish solving Maxwell's equations have . Allantij showed an antenna model improved the overall value of the proportion of the voltage wave, increase bandwidth In addition to giving him a more stable long distance. Study antenna adaptive, which is the best levels used in smart antennas and signal systems with different levels of intelligence and work simulation using (demand) to one of the levels in the system and analyze its results were used algorithm less square error rate high Astaqraratha and simplicity mathematically was a simulation of the system operation .

Keyword: antenna, wavelengths, antennas adaptive simulation.

I. INTRODUCTION

The antenna is the power adapter, designed to transmit or receive electromagnetic waves. In other words, turning the antennas electromagnetic waves into electrical currents, and vice versa. Antennas used in systems such as radio and television broadcasting, Laselky connection from point to point, and wireless local area networks, computers, radar, and space exploration. The antennas are more widely used in the air or in outer space , electromagnetic waves from the two regions, one electrical and other magnetic, connected to each other and the area resulting from each other and publish in a vacuum as a wave of the Cross without loss in their energies. And Maxwell's equations describing electromagnetic waves emergence in certain circumstances. But usually enough calculates the energy released in ways that approximate calculation.. [1]

$$E = -jw\mu_0 \oiint_s [J(\acute{r}) = \frac{e^{-jko\,|r-\acute{r}|}}{4\pi|r-\acute{r}|} + \frac{1}{ko^2}(\nabla.J(\acute{r}))\nabla\frac{e^{-jko\,|r-\acute{r}|}}{4\pi|r-\acute{r}|}]d\acute{s} + \oiint_s [M(\acute{r}) * \nabla\frac{e^{-jko\,|r-\acute{r}|}}{4\pi|r-\acute{r}|}d\acute{s} \quad \ldots\ldots\ldots\ldots(1)$$

which for the far-field (r→∞) reduces to

$$E = -jw\mu_0 \frac{e^{-jkor}}{4\pi r} \oiint[(\bar{I} - \hat{r}\hat{r}).J(\acute{r}) - \epsilon_o\mu_0 r * M\acute{r}e]^{jkor.\acute{r}}d\acute{s} \quad \ldots\ldots\ldots\ldots(2)$$

where

I =unit dyad
r =defines location of observation point
ŕ = defines location of the integrated surface current densities
r̂ =unit vector in radial direction
ϵ_o =free-space permittivity
μ_o = free-space permeability
on the antenna,

$$R = r = \frac{2D^2}{\lambda} \quad \ldots\ldots\ldots\ldots\ldots\ldots(3)$$

where D is dimension of the antenna .This is due to the varying propagation distances of field contributions from different parts of the antenna to an observation point P , The bigger the higher the antenna, where upwards better quality than the antenna's ability to transmit a signal farther, in Eq . 3. we can find the antenna input impedance by measuring the voltage reflection (Γ)and voltage standing wave ratio (VSWR) where:

$$VSWR = Vmax/Vmin = 1 + |r| \,/\, 1 - |r| \quad \ldots..(4)$$

$$r = Zin - Zo/Zin + Zo \quad \ldots\ldots\ldots\ldots(5)$$

Consider an antenna located at the origin of a spherical coordinate system [2].

II. RECEIVING ANTENNAS

The size of Antennas can be designed different directional properties, so you do not have to send and pick up signals equally in all directions.

The simplest antenna hanging from one wire horizontally consists of a straight or a metal rod. And connects one side of the antenna connected to the receiver. . The use of bull antennas with frequency receivers and mobile TV included, however Transceivers phones.Antenna TV is the most commonly used is a dipole, where consists of straight metal rod, or wire Split in the middle. The antenna consists of two electrodes bilaterally involving bilateral relate to on both sides, with the fact that one of them Mhtora. It should be the overall bipolar half the wavelength used her along. You can also strengthen the dipole antenna performance by adding reflectors, routers, consisting of metal rods, similar in almost Pole duo length, and placed behind the bipolar and in front of him. And reach most of the TV antennas with the receivers mediated shielded wire package, which prevents pick up the receiver to interference from household electrical appliances.

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Dr. Maha Abdul Ameer Kadhum, Technical Instructors Training Institute, Middle Technical University, Çankaya (Ankara), Turkey.
E-mail: maha.kahdum@yahoo.com

III. TRANSMITTING ANTENNAS

It is a tool that enables us to radiation electric power from the transmitter to the atmosphere in the form of waves of electromagnetic It is useful to know that the transmitting antenna specifications apply to the receiving antenna also where it can be used as antenna transmissions and reception as is the case in many of the antennas systems and antennas communication systems phones . each antenna a number of important characteristics that gain and dirduection,radition pattern ,input impedance efficiency .

IV. ANTENNAS DISHES

This antenna consists of a metallic surface of the concave-shaped bowl that collects rays in its focus is also working mirrors concave and the range of bandwidth a major from 1 to 10 GHz ,and with gain 10 to 20 dB depending on the diameter dish and pack emits focused and narrow width as shown by the pattern of its radiation is used in the field of microwave transmission networks between the microwave frequencies in the line of sight connections .unichr used in satellite communications to receive television stations via satellite

V. SMART ANTENNAS

System of elements capable Ay broadcast and radiation associated with a processor, referring multi entrances and exits (MIMO) processes the digital signals received him, according to a certain algorithm enables it to direct maximum radiation towards the desired user and track its course and that the idea of smart antennas complex and interdependent and rely on more than aware of such software systems and processing of digital signals and wave propagation depends on where the radiation pattern where the non-static and varies according to the coming of the future of the signal based on the arrival of the coming of the future reference angle of the antenna re-directing radiation to serve the user and the process guiding the beam and trace the path depends on the particular algorithm and systems have to processing signals reference input and output and then control the direction figure (1) illustrates the idea of smart antennas.

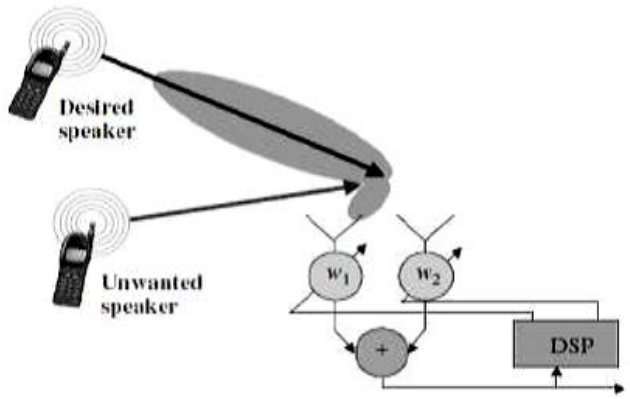

Fig .1 Shown Concept of Smart Antenna

VI. TYPES OF SMART ANTENNAS

Smart antennas can be divided depending on the radiation pattern pattern)) generated by the antenna in addition to the strength of the ability that shed on the user as well as the overlap rate and the ability to reduce it where smart antennas are divided into two types:

1. Switched beam antenna
2. Adaptive antenna

Figure 2 ailtration the radiation pattern of the antenna beam whimsical.When the user miss from the sector this system works on the choice of beam a signal the strongest for the user and keep the system in the case of control and selection of signal strength, and throughout the period of time to call in the event exposed the armband ability of weakness or decline due to user movement within the same cell, the antenna system of a whimsical him the ability to switching the weak beam and deliver the user to a new more powerful beam one of the major flaws so the system is unable to generate adequate protection prevalence of multiple compounds (multipath component) coming close to the desired user trends. Figure 3 ailtration the radiation pattern of the adaptive antenna.

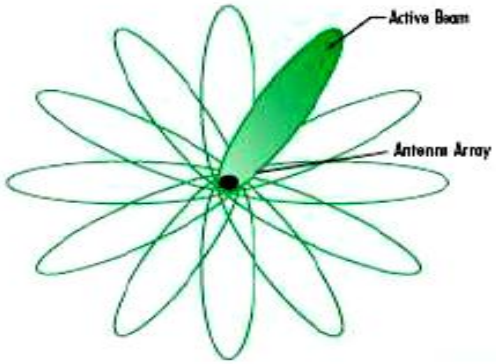

Fig .2 Shown The System Radiation Pattern of The Antenna Beam

VII. ADAPTIVE ANTENNA

This type represents the most intelligent and efficient model in modern antenna technology as this type of antenna has the ability to direct all radiation pattern or ability toward the user desired Figure 3 atltration the system radiation pattern of the antenna adaptive

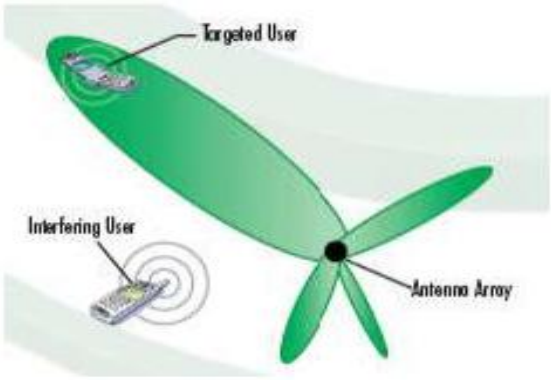

Fig .3 Shown The System Radiation Pattern of The Adaptive Antenna

VIII. TRANSMITTER SYSTEM COMPONENTS IN SMART ANTENNAS

Transmitter system consists in smart antennas of an array of antennas connected to the unity of the radio or radiation (broadcast) and receive this unit orders radiation and determine the style and directed towards the desired user and blocked the rails in accordance with the next instruction from the system algorithm, as well as from the results of treatment coming from the future reference angle and that the labeling You can determine the location and pattern of moves and then directing the maximum radiation pattern figure (4) shows Transmitter system components in smart antennas

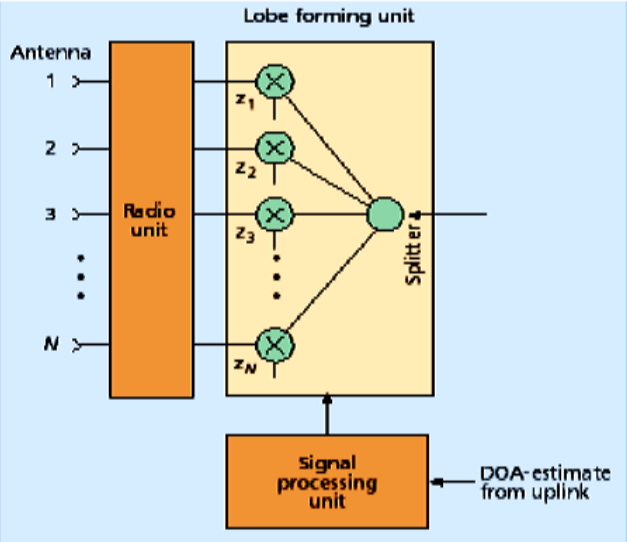

Fig .4 Shown The Transmitter System

IX. MATHEMATICAL RELATIONSHIP OF THE RADIATION PATTERN IN SMART ANTENNAS

The radiation pattern in smart antennas Alpatrin governed by a set of controllers Perhaps the most prominent of the algorithm, that determines the shape and direction according to the software system depends on a number of specific data previously . The radiation pattern in Alhoaiaata for smart given by the equation

$$G(\varphi) = \frac{1}{n}\left|\frac{sinn\,(\pi \text{kcos}\,\varphi+\frac{\alpha}{2})}{sin\,(\pi \text{kcos}\,\varphi+\frac{\alpha}{2})}\right| \quad \ldots\ldots\ldots(6)$$

Whereas

φ =angle of arrival

α = Phase shift

n= number of antenna array

X. REASUREACH PROCEDURE

A formal simplification of electromagnetic antenna problems can be achieved by employing the equivalence equation 2,3,4,5 If interest is restricted to the field solution in a limited region of space, The equivalent sources are not uniquely defined, and there are many different ways of constructing them .In general, the equivalent sources are a composition of electric and magnetic surface current densities representing the excitation terms in Maxwell's equations.

For signal processing in smart antennas have been applied program MATLAB for the purpose of simulating the system synthetic antenna adaptive .walta consists of an array of antennas transmitter and receiver where they are through the antenna to increase depending on the number n depending which need to be addressed with the same nse operation 2GHZ with separation dselection 0.075, Value solved for a particular antenna and a given excitation .Typically, exact solutions of Maxwell's equations are not available and thus numerical modeling is often used to compute approximate solutions for practical configurations and than divided into 30 segment.

XI. RESULT AND DISSECTION

The work simulation SAS using generater and then impose the following values of income 5000 signals to a series of train her values 1-1 to simulate the sender is sending binary values, coefficient step size 800 g also had multiple tracks suffer earn different and which contain both the magnitude and phase of the carrier frequency of 400 MHz this means that the wave length 0.75 m value equal to 0.35 d propagation delay from the sender to be up to the first item, and then superimposed 100ms**,** Table 1 shows the characteristics of the antenna, which is described in the theoretical part of the search

Table. 1. Shows The Characteristics of The Antenna

Freq.(G HZ)	1	2
ZinΩ	244.66-J0.86	165.13+ J0.81
VSWR	1.7	1.4
Gain db	2.36	3.28
Length m	0.71m	0.98m
Redaction	49%	52%

XII. CONCLUSIONS

The objective of the project is the study of systems of smart antennas for use in mobile systems and to achieve an increase in capacity and range through antennas grade adapters, which are the work of simulating them using an algorithm (LMS). Through the radiation pattern at an angle of 60 degrees, there was a clear change in the amount of power when changing the size of rows The coefficient of step, Compared to normal antennas with intelligent antenna by increasing the number of antennas adaptive decreases the percentage less squre error antenna and this shows the preference for the use of smart antennas to control the step size of the coefficient.

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