Journal of Telecommunications System & Management

Nayak and Singh, J Telecommun Syst Manage 2018, 7:1
DOI: 10.4172/2167-0919.1000156

Commentary Open Access

Performance and Improvement of Antenna Designs in Modern Wireless Communication System

Sambasiva Nayak R* and Singh RP

Department of Electronics and Communication Engineering, Sri Satya Sai University of Technology and Medical Science, Sehore, Bhopal, Madhya Pradesh, India

Abstract

In this paper, the cell innovation and the remote correspondence innovation is creating and enhancing quickly. The reception apparatus goes about as the scaffold between the client terminal and the base station controller. Being a key segment of the remote correspondence framework, the reception apparatus' fundamental capacity is to communicate and to get electromagnetic waves. It will, to an expansive degree, influence the quality and the speed of the correspondence. With the advancing of the reception apparatus innovation, the versatile terminal gadgets have developed from the unique specialized devices to exceptionally intellectualized types of gear. The imparted content was likewise expanded, as there are presently FM programs, TV shows and web. All these, be that as it may, conveys requesting benchmarks to the reception apparatus. For instance, it requires a considerably higher data transmission and best exhibitions from the reception apparatus to help the complex applications and correspondence capacity of the versatile terminals. Furthermore, the correspondence system's convenient terminal has almost bolted the position of the recieving wire, which requests that the span of the radio wire must be downscaled. The control of the wave speed, shape and its directivity can be typically streamlined by enhancing the radiation qualities of the recieving wires, which will help the general execution of a framework. In along these lines, additionally enhanced are the channel limit and the recurrence use proportion. This paper, starting with the presentation of the improvement status of the remote correspondence framework and the radio wires, contemplates a portion of the plans of new reception apparatuses. With that review, this paper likewise breaks down the advancement heading fitting to current correspondence framework and the important gadgets, and in addition the structure adjustment and pattern of reception apparatuses.

Keywords: Mini micro strip antenna; Ultra wideband antenna; Broadband polarization diversity antenna; Reception apparatus; Modern remote communication framework; Mobile terminal; Base station controller (BSC); Macro diversity; Space diversity

Introduction

From the primary radio wire conceived out of the investigations of the German, Hertz, the remote correspondence framework had created from the center and long wave ones to the vertical energized electrically little receiving wire [1]. At that point there are the mandate receiving wire wave reception apparatus, and the order transmitting radio wire. At the transmitting terminal, the recieving wire changes over the vitality from high-recurrence current into the radio wave vitality of a similar recurrence. At the accepting terminal, it changes the high recurrence wave vitality into the present vitality of the separate recurrence. In the WLAN, the recieving wire's configuration is the way to a bigger framework limit and more extensive flag scope [2]. Basically, the recieving wire is a vitality converter. Being the most quickly creating area of present day correspondence framework, portable correspondence, alongside the remote get to correspondence framework, is indistinguishable with radio wires. The progressing of current remote correspondence framework drives the reasonable transformation and tech-development of the reception apparatus. While the reception apparatus' development will likewise have its affect on the advancement of the correspondence framework [3].

Wireless Communication System

The remote correspondence framework is a specialized strategy which utilizes electromagnetic wave to unreservedly spread data over the space. Its improvement started from the 1930s [4]. Significant points of reference are: the find of electromagnetic wave in 1888, the FM hypothesis in 1920, the semiconductor tube in 1960, and CDMA's endorsement by the FCC of the U.S. in 1992, and the IUT's institutionalization of the 3G out of 1999 and so on [5]. The following is the Table 1, the present radio-recurrence range.

Current remote correspondence framework principally comprises: the 2G portable cell organize framework spoke to by GSM, IS-95; the 3G by CDMA2000, WCDMA, and TDSCDMA. It additionally incorporates WLAN, WMAX, the radio TV framework and the satellite correspondence framework [6].

The correspondence framework can be separated into the simple correspondence framework and the computerized transmission framework, with the last supplanting the previous. The models for the correspondence framework are outlined in Figure 1 beneath.

Current remote correspondence framework principally comprises: the 2G portable cell organize framework spoke to by GSM, IS-95; the 3G by CDMA2000, WCDMA, and TDSCDMA. It additionally incorporates present day electronic supplies' mix has influenced the specialized gadgets to end up plainly always conservative, this reason requires the reception apparatuses to be littler and littler. In term of the present innovation, it is a colossal undertaking to minimized the radio wires without lessening its capacity. For the present, on board there are many looks into being advanced, to scale down the volume of the

***Corresponding author:** Nayak RS, Department of Electronics and Communication Engineering, Sri Satya Sai University of Technology and Medical Science, Sehore, Bhopal, Madhya Pradesh, India, E-mail: sambanayak@gmail.com, ramneeluphd@gmail.co

Received February 15, 2018; **Accepted** March 28, 2018; **Published** April 06, 2018

Citation: Nayak RS, Singh RP (2018) Performance and Improvement of Antenna Designs in Modern Wireless Communication System. J Telecommun Syst Manage 7: 156. doi: 10.4172/2167-0919.1000156

Waveband		Wavelength	Frequency	Mode	Applications
Long wave		30000 m~3000 m	10 kHz~100 kHz	Ground wave	Ultra-long range radio communication and navigation
Medium Wave		3000 m~200 m	100 kHz~1500 kHz	Ground wave and Sky wave	AM radio broadcasting
Intermediate waves		200 m~50 m	500 kHz~6000 kHz		
Short wave		50 m~10 m	6 MHz~30 MHz	Sky wave Microwave	
Microwave	Meter wave	10 m~1 m	30 MHz~300 MHz	Approximately rectilinear wave	FM radio broadcasting
	Decimeter	1 m~0.1 m	300 MHz~3000 MHz	Rectilinear wave	Television Radar Navigation
	Centimeter wave	10 cm~1 cm	3000 MHz~30000 MHz		
	Millimeter wave	10 cm~1 cm	3000 MHz~30000 MHz		

Table 1: Radio-frequency spectrum.

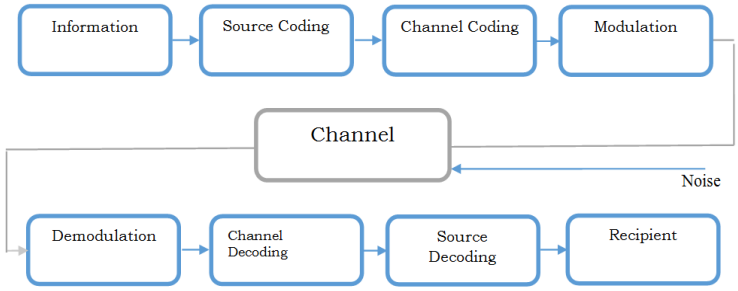

Figure 1: Model of communication system.

recieving wire, for example, to append a parasitic fix to the radiation patch; or to apply a F-molded smaller scale strip patch; or a Coplanar waveguide full unit. The expansion of coordination of electronic gear as a rule requests that the radio wire can give at least two remote administration in an expansive recurrence go. The broadband recieving wire and the multiband reception apparatus are met all requirements to such a request. This, notwithstanding, brings about the multifaceted nature of the sort of reception apparatus. The sorts of the CPW-bolstered radio wire and the planar monopole antenna have turned into the concentration of study [7]. The Table 2 beneath demonstrates the significant kinds of the reception apparatuses of today.

In term of the current technology, it is a tremendous task to compact the antennas without diminishing its function. For the time being, aboard there are many researches being put forward, to downsize the volume of the antenna, such as to attach a parasitic patch to the radiation patch; or to apply a F-shaped micro strip patch or a Co planar wave guide resonant unit. The increase of integration of electronic equipment usually demands that the antenna can provide two or more wireless service in a broad frequency range. The broadband antenna and the multiband antenna are qualified to such a demand. This, however, results in the complexity of the type of antenna. The kinds of the CPW-fed antenna and the planar mono pole antenna.

Three Types of Antenna Designs

Mini micro-strip antenna

As a recieving wire at present connected generally on the radio supplies of 100 MHz~100 GHz's recurrence space, the smaller scale strip radio wire utilizes miniaturized scale strip fix as its radiation source. Being conservative and light weighted, it can likewise thankless rascal into a framework with dynamic gadget and electric circuits. Up till now, smaller scale strip recieving wire's trial and registering techniques are both ready. When all is said in done, the scaling down of the recieving wire implies just to cut back its volume, and to leave its working recurrence in place. The section beneath is the solid plans for the scaling down, appeared in Table 3.

Ultra-wideband antenna

Ultra-wideband antenna mainly applies to short range radio communication system with features of strong ant multipath effect, wide bandwidth and low power thus making ultra-wideband antenna research highpoint Ultra wideband antenna, commonly known as the antenna with very wide bandwidth, is capable of sending picoseconds or nanoseconds narrow-band signals. Technology features of ultra-wideband antenna are mainly as follows.

(1) Tiny reflection and allows UWB antenna have a good input impedance matching within working frequency bandwidth.

(2) The antenna frequency bandwidth should meet the demands of 3.1 GHz to 10.6 GHz.

(3) High standard of non-dispersion characteristic and difficulty of antenna design increases.

(4) Very small volume.

(5) Radio efficiency should guarantee the effect of Omani-direction, and should be high and stable.

(6) Power pattern in each frequency bin should be nearly same and has stable gain.

Broadband polarization diversity antenna

As an effective communication technology, diversity technique compensates for channel fading and thus becomes research highpoint with the development of mobile communication technology. The feature of diversity technology is to choose the best signal, receive the sample signal through various means and then combine and classify them. The implementation process of this technology cost little and doesn't need to increase the transmission power or bandwidth. As a compelling correspondence innovation, assorted variety method makes up for channel blurring and consequently moves toward becoming investigate highpoint with the advancement of portable correspondence innovation [8]. The component of decent variety innovation is to pick the best flag, get the example motion through different means

Antenna Types	Description
Micro-strip (2.4 GHz)	Commonly applied on radio equipments of broad frequency ranges, such as airborne or portable devices.
Ultra-wideband	With signal broadband of 500 MHz or more. Mainly spherical antennas, ellipsoidal monopole or bi-conical antennas. At early periods it was used mainly in military systems.
Conical	An antenna used widely in ultra-wideband EMPs
TEM horn	The main form of UWBs. Constructed mainly by two triangle panel and other components.
Diagonal spiral	This antenna's performance is not closely linked to its frequency. Its diagonal angle determines the structure, and they are one beamed, two beamed or four beamed.
Log-periodic	This antenna's performance adjusts periodically along with the logarithms of its frequency.
Planar monopole	It adopts mainly the structure of round disk, elliptical disk or planar square, but requires a vertical floor to support it.
Diversity antenna of MIMO system	Exclusively designed for portable devices like the cell phone & others.

Table 2: Major types of antennas.

Schemes	Description
Increase the dielectric constant	Micro-strip antennas of the half-wave radiation design usually work on the TM10 or TM01 model, their resonant frequency *f*. Because the resonance length is inversely proportional to the $(r)^{1/2}$, the best way to downsize the radiation device is to use materials of greater dielectric constant. On the other hand, such material is limited by the transmission gain of the micro-strip antenna.
Load technology	Mainly the resistor loading and the short-circuit loading. The short-circuit loading can be divided into three types: loading the short-circuit probe, loading the short-circuit plate, and loading the short-circuit plane. The last method can reduce half of the length, and the probe method can further reduce 30% than that. Because of the characteristics of the antenna under the resonant frequency, we can further reduce the frequency and the size by adding a loading resistor near the coaxial feeder point.
Extend the surface current path	Another effective way to reduce the antenna size. It is based on the earth plate and the patch meandering technology. To extent the effective surface current path, it slots the non-radiation side of the patch.
PIF, PIL structure	Exclusively aimed at the antennas that is coaxial fed and use the air layer as the medium, this method solves the coaxial impedance effect. Its basic modes include the L-shaped probe technology and the L shaped micro-strip line feeding.

Table 3: miniaturization of micro-strip antennas.

Classification	Function	Description
According to the purpose of diversity	Macro diversity	Purpose of which is to resist slow fading. Generally speaking, Two antenna sites are needed to send and receive two or more signals, in order to avoid signals sent by center being cut off by high points such as mountainside, thus the mobile station couldn't receive the signals.
	Micro diversity	Purpose of which is to resist fast fading. The technology belongs to one antenna site.
	Space diversity	It is among the most common forms which use several separate antennas in the space. Though it's easy to be done but it needs a lot of space. The advantage of this method is to receive several samples from emission signal without occupying extra frequency resources.
According to ways of receiving independent path signals	Frequency diversity	It actually transmits signals through different frequencies, which could gain the multi-path benefit in communication environment.
	Angle diversity	Also known as pattern diversity, which separates signals of different directions through different pattern directions.
	Polarization diversity	The method of achieving diversity gain is to receive orthogonal planning components. It applies to terminal equipment with strict demands of volume because of its small overall volume.
	Time diversity	It integrates interweaving technology and channel coding, which allows receiving terminal to receive several samples from emission signal simultaneously.

Table 4: Diversity antenna classification.

and afterward consolidate and group them. The execution procedure of this innovation cost nearly nothing and doesn't have to build the transmission power or data transfer capacity. At present, principles grouping of decent variety recieving wire are appeared in Table 4.

Conclusions

In this paper presents the development status of the wireless communication system and the basic research direction of antenna; then it mainly analyzes several antenna modes of wireless communication system. These antennas all designed based on the rules of miniaturization. The antenna mainly applies flat structure for the convenience of integration and miniaturization of mobile terminal. To meet the development of modern communication system and relevant equipment, new antennas with high performance has developed rapidly. However, only by breaking through current technology limitations and defects can the new antennas be fully developed in aspects of technology, products and standardization. Combined with communication industry, the mature and application of new type of antenna need concerted effort [9]. In terms of new antennas, undoubtedly, there are many technology difficulties to overcome. For example, multi-standard antenna could flexibly control signals with different patterns by solving the problem of mutual interference of different signals; To solve this problem, equipment support such as high-performance phase shifter and combiner with high isolation is needed; and the intelligent antenna faces technology difficulties of realizing remote control technology and antenna beam scanning more than one dimension; active integrated antenna must breakthrough the limitation of existing device volume and performance, and applies radio frequency devices with multiple frequency ranges in antenna system, in order to integrate RF module and antenna module.

References

1. Wong KL, Hsu NH (2001) A broad-band rectangular patch antenna with a pair of wide slits. IEEE Transactions on Antennas and Propagation 49: 1345-1347.
2. Emadian SR, Ghobadi C, Nourinia J, Mirmozafari MH, Pourahmadazar J (2012) Bandwidth Enhancement of CPW-Fed Circle-Like Slot Antenna With Dual Band-Notched Characteristic. IEEE Antennas and Wireless Propagation Letters 11: 543-546.
3. Wang W, Jiang Q, Zhou X (2005) Optimization of large angle and broadband log-period dipole antenna (LPDA)[J], Safety and Electromagnetic Compatibility 23: 12-14.
4. Angelopoulos ES, Anatopoulos AZ, Kaklamani DI, Alexandridis AA, Lazarakis F, et al. (2006) Circular and elliptical CPW-fed slot and microstrip-fed antennas for ultrawide-band applications [J]. Antennas and Wireless Propagation Letters 5: 294-297.

5. Wang Y, Xu Q, Wu Z (2005) Design of ultra-wideband bi-conical omni-directional antenna. Radar Countermeasure 1: 25-27.

6. Dong N, Cheng S, Liu H (2005) Simulation design of ultra-wideband spiral antenna. Guidance & Fuze 6: 48-51.

7. Chen ZN, Chia YWM (2000) Broadband monopole antenna with parasitic planar element. Microwave and Optical Technology Letters 27: 209-210.

8. Ogawa K, Uwano T (1994) A diversity antenna for very small 800-MHz band portable telephones. IEEE Transitions on Antennas and Propagation 42: 1342-1345.

9. Wang Y, Zhang N (2005) Overview of Ultra-wideband wireless communication. Journal of Yunnan University of Nationalities 14: 3-7.