

Charging Appliances Using Radio Waves

Parvaiz Ahmad Dar

Assistant Professor

Govt. Degree College for Women, Pulwama, Srinagar, J& K-192301, India

Abstract: Battery life of cellular telephones is an issue for the users. Subscribers are complaining about the battery life of cellular devices that they don't have long battery life and they need to charge their telephone frequently. Conveyable electronic gadgets are exceptionally well known these days. The use of these chargeable electronic gadgets is increasing; the requirement for more battery life is therefore also increasing. These batteries need to be charged intermittently. It is a trouble to charge or change the battery, particularly in case of portable devices when there is no source of electricity around. The need is to remotely charge the battery. Present world requires a complete technology. Keeping this in mind I propose "Wireless Power Transfer for the Charging of Various Appliances Using Radio Wave".

IndexTerms – Radio Waves , Wireless Power, Rectenna, RF Energy

I. INTRODUCTION

Radio waves are a type of electromagnetic radiation with wavelengths in the electromagnetic spectrum longer than infrared light. Radio waves have frequencies as high as 300 GHz to as low as 3 kHz. At 300 GHz, the wavelength is 1 mm, and at 3 kHz is 100 km. These electromagnetic waves, they travel at the speed of light. Naturally occurring radio waves are generated by lightning, or by astronomical objects.

Artificially generated radio waves are used for fixed and mobile radio communication, broadcasting, radar and other navigation systems, communications satellites, computer networks and innumerable other applications. Radio waves are generated by radio transmitters and received by radio receivers. Different frequencies of radio waves have different propagation characteristics in the Earth's atmosphere; long waves can diffract around obstacles like mountains and follow the contour of the earth (ground waves), shorter waves can reflect off the ionosphere and return to earth beyond the horizon (skywaves), while much shorter wavelengths bend or diffract very little and travel on a line of sight, so their propagation distances are limited to the visual horizon.

In order to receive radio signals, for instance from AM/FM radio stations, a radio antenna must be used. However, since the antenna will pick up thousands of radio signals at a time, a radio tuner is necessary to tune in a particular signal. This is typically done via a resonator (in its simplest form, a circuit with a capacitor, inductor, or crystal oscillator, but many modern radios use Phase Locked Loop systems). The resonator is configured to resonate at a particular frequency, allowing the tuner to amplify sine waves at that radio frequency and ignore other sine waves. Usually, either the inductor or the capacitor of the resonator is adjustable, allowing the user to change the frequency at which it resonates.

Microwaves are also radio waves (a form of electromagnetic radiation) with wavelengths ranging from as long as one meter to as short as one millimeter. The prefix "micro-" in "microwave" is not meant to suggest a wavelength in the micrometer range. It indicates that microwaves are small in wavelength compared to the other waves used in typical radio broadcasting.

Microwaves are utilized within rocket correspondence, and a great part of the world's information, TV, what's more phone correspondences are transmitted long separations by microwaves between ground stations and correspondences satellites. Microwaves are additionally utilized in microwave broilers what's more in radar technology. With cell telephones turning into an essential some piece of life, the reviving of cellular telephone batteries has dependably been an issue. The cellular telephones shift in their discussion time and battery standby as per their maker and batteries. All these telephones regardless of their maker and batteries have to be put to energize after the battery has emptied out. The principle destination of this current proposal is to make the reviving of the cellular telephones free of their producer and battery make

II. FRAME WORK

The framework of charging of electronic gadgets using radio waves comprises mainly of four parts as:-

1. Transmitter Module.
2. Beneficiary Module.
3. Rectification Circuit.
4. Sensor Circuitry.

1. Transmitter Module

Radio waves are used for transmission of sound messages, or information, for [communication](#) etc over a wireless channel. The information is modulated on the electromagnetic carrier wave as amplitude modulation (AM) or as frequency modulation (FM) or in digital form (pulse modulation). Transmission therefore involves not a single-frequency electromagnetic wave but a band of frequencies whose band width is proportional to the information rate.

Radio waves produced by different types of oscillators is transmitted by antennas in different directions are bent or even completely reflected back to Earth by the ionosphere layers. These waves may get reflected by the Earth and be reflected by the ionosphere repeatedly, making radio transmission around long distances possible. Long-distance communication is also made

possible by ground wave propagation. These ground waves closely follows the contour of the Earth, even over water. The range of the ground wave (up to 1,600 kilometres). The bending and reflection of the sky wave by the ionosphere depend on the frequency of the waves. Under normal ionospheric conditions 40 MHz is the highest-frequency radio wave that can be reflected from the ionosphere. In order to accommodate the large band width of transmitted signals, [television](#) frequencies are necessarily higher than 40 MHz. Television transmitters must therefore be placed at greater heights.

Magnetron is a high power microwave oscillator and it is used as a part of microwave broiler and radar transmitter. It is itself an amazing vacuum tube that has permanent magnet. This magnet is setup to influence the motion of electrons that travel from cathode to the Anode. Magnetron used to convey more power than reflex klystron or Gunn diode.

The message signal, here is the alternating current {ranges from 5V-50V} is modulated with radio wave signals (See fig.3).The modulated wave is then transmitted through an antenna. An antenna acts as a transducer which converts a time-varying electric current into an [electromagnetic wave or field](#), propagating freely through a medium (air or space). This makes these waves suitable for mobile, satellite and deep-space, broadcast communications, and other applications in which the laying of physical connections may be difficult or costly. Microwave transmitters produce microwave beams whose spreading angle depends on the frequency of the constituent waves and the dimensions of the antenna.

2. Beneficiary Module.

The main component of an electronic gadget is going to be the Antenna which captures the RF energy and the rectifier circuitry which converts the signal received by an antenna signal to DC power. The combination of a rectifier and an antenna circuit is called as a rectenna. A simple rectenna can be built from a Schottky diode set between receiving dipole antennas. Rectennas are efficient at changing over microwave signals to DC power. Efficiencies over 90% have been seen reported with Schottky diode based rectennas.

3. Rectification Circuit.

A rectenna is a redressing reception apparatus, a receiving wire used to change over microwaves into DC power. Being that reception apparatus alludes to any kind of gadget that changes over electromagnetic waves into power. Similarly, for the AM/FM & TV radio wave conversion to DC power, another type of the antenna is used. A basic rectenna might be developed from a Schottky diode put between the receiving wire dipoles as indicated in Fig.5. The diode corrects the current instigated in the radio wire by the microwaves.

4. Sensor Circuitry.

The sensor circuitry is shown in Fig.1., which detects the signals received by electronic gadgets.

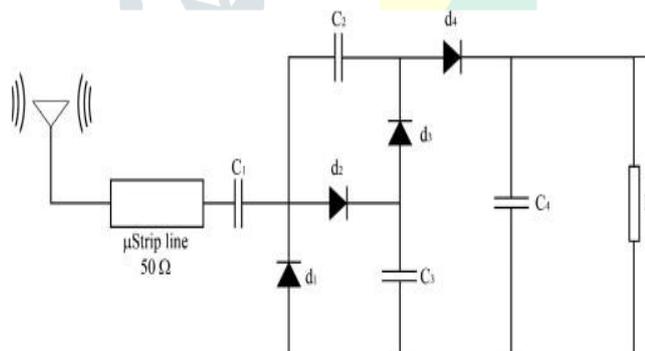


Fig.1.

III. CONCLUSIONS

In the era of Science and Technology, the portable devices like cell phones need to be recharged. Other Devices like Laptops etc. also need to be recharged regardless of the place where one is working. Our Communicating devices need to be recharged without being interrupted. A new use of the Rectenna/other rectifying antenna and a sensor in an Electronic Gadget could provide a new option. This new method of wireless recharging will certainly bring innovative change in recharging electronic gadgets and will upgrade our day to day life. This paper demonstrates a new method of using the radio wave's to recharge the Electronic Gadgets.

REFERENCES

- [1]. Theoretical and experimental development of 10 and 35 GHz rectennas “IEEE Transactions on Microwave Theory and Techniques”, vol. 40, no. 6, June 199.
- [2]. Pozar, David M.” Microwave Engineering Addison–Wesley Publishing Company. “,2010.
- [3]. Wireless Power Transmission “A Next Generation Power Transmission System, International Journal of Computer Applications” Volume 1 – No. 13, 2010.
- [4]. Lander, Cyril W “Rectifying Circuits”. Power electronics (3rd ed. ed.),2011.
- [5]. Espejel, J.D., “RF to DC power generation”, University of Maryland, December 2003.
- [6]. Hagerty, J.A., “Nonlinear Circuits and Antennas for Microwave Energy Conversion”2009.
- [7]. Lin, G.H., “Topological generation of Voltage Multiplier Circuits”, September 2003.
- [8]. Pylarinos, L. and Roger, E. “Charge Pumps: An Overview”, 2010.
- [9]. Sedra, A.S. and Smith K.G, “Microelectronic Circuits”, 5th Edition, 2004.
- [10]. Stremmler, F.G., “Introduction to Communication Systems”, 3rd Edition, 1990.
- [11]. <http://conversations.nokia.com>- Nokia’s Explanation for Inductive Charging.
- [12]. <http://en.wikipedia.org/wiki-Introduction> to Microwave.
- [13]. <http://en.wikipedia.org/wiki-Introduction> to Radio wave.

