Wireless Charger – A Review

B.Prabakaran¹, C.Vivekanandan²

¹Assistant Professor-EEE, Sri Shakthi Institute of Engineering and Technology, Sri Shakthi Nagar, L&T By-Pass, Chinniyampalayam, Post, Coimbatore-641062.
²Professor-EEE, SNS College of Engineering, SNS Kalvi Nagar, Sathy Main Road (Opp.CRI Pumps), Kurumbapalayam (Po), S.S.Kulam (via), Coimbatore-641107.

Abstract- Wireless voltage receivers can be added in series to get high voltage. Two volts which is received by the wireless receiver can be added with another two volts which is received by another wireless receiver by connecting them in series and four volts can be produced. These four volts can be used to charge a battery of a mobile phone wirelessly. Similarly, the voltage receiver circuits can be added in series to get high voltage for similar applications.

Keywords: Connecting wireless receivers in series, Wireless mobile Charger.

I. INTRODUCTION

Wireless power transfer is the transmission of electric power from a power source to a consuming device without using manmade conductors [1]. Wireless power techniques fall into two categories. They are non-radiative and radiative. In non-radiative techniques, power is transferred over short distances by magnetic fields. They use inductive coupling between coils [2]. In few devices they use electric fields using capacitive coupling between electrodes. In radiative techniques, power is transmitted by electromagnetic radiation beams, like microwaves or laser beams. These techniques can transport energy longer distances. The beam must be aimed at the receiver. These techniques are also called as power beaming. An important issue associated with all wireless power systems is limit in the electromagnetic fields to the exposure of people and other living things to avoid potential injury.

Power transmission using radio waves can be made more directional. Power transmission is possible to longer distance by power beaming. Power beaming uses shorter wavelengths of electromagnetic radiation, usually in the microwave range. A rectenna is used to receive the microwave energy and convert it into electricity. Rectenna conversion efficiencies of more than 95% have been achieved. There was proposal for the transmission of energy from orbiting solar power satellites to Earth using microwaves and Power beaming. The beaming of power to spacecraft leaving orbit is considered [3].

In Radio wave Power Transmission, through modulation, the modulated signal can be transmitted through antennas. This modulated signal can be received through the antennas at the receiving end. At the receiving end, the modulated signal is demodulated and the original signal is retrieved.

Modulation is the process of converting the low frequency signal into a high frequency signal. Converting the low frequency signal to high frequency signal has an advantage of transmitting the signal over the long distance. The low frequency signal is called modulating signal. High frequency signal is called Carrier signal. In modulation process the modulating signal modulates the parameters of the carrier signal. The resultant signal out of the modulation is process called modulated signal. Demodulation is the process of recovering the signal from the modulated signal. This is the reverse of the modulation.

The low frequency signal which has to be transmitted is the modulating signal. This cannot be directly transmitted without modulation [4]. The reasons are

(i) Since the wavelength of the low frequency signal is very high, the size of the antenna required for radiation becomes very high.
(ii) Mutual interference can take place with the signals from various transmitters. This may lead to complexity in separating the various signals.
(iii) The low frequency signal cannot be transmitted to longer range.

The issue of exposure of people and other living things to potentially injurious electromagnetic fields restricts the Microwave wireless power transmission in the earth to few (1-2) watts.

In this proposal, the demodulated signal which is of few voltage is considered as a voltage source. These voltage sources can be added in series to get the higher voltage. This high voltage can be used to power the appliances.

II. BLOCK DIAGRAM
The block diagram to add two voltages received is shown in Fig.1. The transmitted signal is received using an antenna. The particular signal can be selected using the tuner circuit. The demodulator gets the original signal. These signals can be added together as per Kirchhoff’s Voltage Law. The Added voltage can be given to the Electrical load.

The Fig.2 [5] shows one demodulator circuit which gets the original signals. This is the very simplest form of FM demodulator circuit. The modulated signal is applied to the tuned circuit (T1, C1, C2 combination). This converts the incoming signal to the original modulated signal which was transmitted. This amplitude signal is applied to a simple diode D1. Here the diode provides the rectification. The Capacitor C3 acts as a filter, and R1 acts as a load.

This demodulator circuit without a load R1 can be added with another demodulator circuit without load R1. This way the high output voltage can be given to the required loads. As an example, the wireless mobile charger block diagram is explained in the next section.

The wireless mobile charger consists of transmitter and receiver. The block diagram for the transmitter is shown in Fig.3. The power supply from the mains is converted into 2 volts Alternating Current (AC) using a step down transformer. The power supply from the mains may be 230V AC or 110V AC depending upon the region. 2V AC from the output of the transformer is the modulating signal which needs to be transmitted. This is modulated using a modulator and carrier signal. This modulated signal is transmitted using an antenna.

Modulation type can be of any analog modulation types such as Amplitude Modulation (AM), Frequency Modulation (FM) and Phase Modulation (PM).

The block diagram for the receiver is shown in Fig.4. The modulated signal which was transmitted using the transmitter is received using a receiver antenna. This is demodulated and 2 V AC, 50Hz signal is received. The received AC signal is added together. This gives 4V AC 50Hz signal. This is rectified using a rectifier and 4V DC output is taken out. This 4V DC output is given to the Mobile Battery for Charging the Mobile Battery.
IV. CONCLUSION

Thus it is concluded that wireless voltage receivers can be added in series to get high voltage for applications like mobile charger. This phenomenon can be used for charging the batteries of digital clocks, wall clocks, pocket radio and toys.

REFERENCES

[2]. New Scientist: Wireless charging for electric vehicles hits the road