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Wireless Charging Of Mobile Phones Using Microwaves

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Abstract- It is a hectic task to carry everywhere the charger of mobile phones or any electronic gadget while travelling or it is very cruel when your mobile phone getting off by the time you urgently need it. It is the major problem in today's electronic gadgets. Though the world is leading with the developments in technology, but this technology is still incomplete because of certain limitations. Today's world requires the complete technology and for this purpose we are proposing 'Wireless Charging of Mobile Phones Using Microwaves'.

I. INTRODUCTION

Microwaves are 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" compared to waves used in typical radio broadcasting, in that they have shorter wavelengths.

Fig.1: A microwave telecommunications tower on Wrights Hill in Wellington, New Zealand

Microwave technology is extensively used for point-to-point telecommunications (i.e., non-broadcast uses). Microwaves are especially suitable for this use since they are more easily focused into narrow beams than radio waves, allowing frequency reuse; their comparatively higher frequencies allow broad bandwidth and high data transmission rates, and antenna sizes are smaller than at lower frequencies because antenna size is inversely proportional to transmitted frequency. Microwaves are used in spacecraft communication, and much of the world's data, TV, and telephone communications are transmitted long distances by microwaves between ground stations and communications satellites. Microwaves are also employed in microwave ovens and in radar technology.

With mobile phones becoming a basic part of life, the recharging of mobile phone batteries has always been a problem. The mobile phones vary in their talk time and battery standby according to their manufacturer and batteries. All these phones irrespective of their manufacturer and batteries have to be put to recharge after the battery has drained out. The main objective of this current proposal is to make the recharging of the mobile phones independent of their manufacturer and battery make. In this paper a new proposal has been made so as to make the recharging of the mobile phones is done automatically as you talk in your mobile phone! This is done by use of microwaves. The microwave signal is transmitted from the transmitter along with the message signal using special kind of antennas called slotted wave guide antenna at a frequency is 2.45 GHz.

II. FUNCTIONING

The basic addition to the mobile phone is going to be the rectenna. A rectenna is a rectifying antenna, a special type of antenna that is used to directly convert microwave energy into DC electricity. Its elements are usually arranged

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in a mesh pattern, giving it a distinct appearance from most antennae. A simple rectenna can be constructed from a Schottky diode placed between antenna dipoles. The diode rectifies the current induced in the antenna by the microwaves. Rectenna are highly efficient at converting microwave energy to electricity. In laboratory environments, efficiencies above 90% have been observed with regularity. Some experimentation has been done with inverse rectenna, converting electricity into microwave energy, but efficiencies are much lower--only in the area of 1%. With the advent of nanotechnology and MEMS the size of these devices can be brought down to molecular level. A rectenna comprises of a mesh of dipoles and diodes for absorbing microwave energy from a transmitter and converting it into electric power. Its elements are usually arranged in a mesh pattern, giving it a distinct appearance from most antennae. A simple rectenna can be constructed from a Schottky diode placed between antenna dipoles as shown in Fig... The diode rectifies the current induced in the antenna by the microwaves. Rectenna are highly efficient at converting microwave energy to electricity.

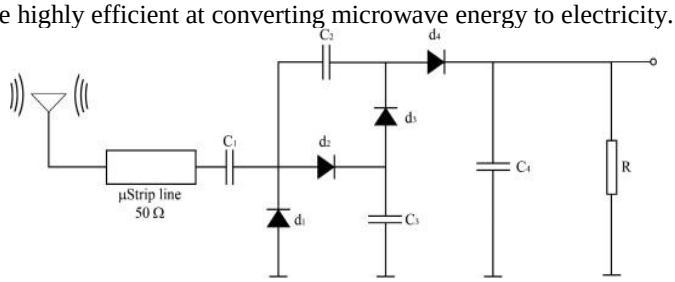

Fig.2: Block Diagram of a Rectenna

It has been theorized that similar devices, scaled down to the proportions used in nanotechnology, could be used to convert light into electricity at much greater efficiencies than what is currently possible with solar cells. This type of device is called an optical rectenna. Theoretically, high efficiencies can be maintained as the device shrinks, but experiments funded by the United States National Renewable energy Laboratory have so far only obtained roughly 1% efficiency while using infrared light. Another important part of our receiver circuitry is a simple sensor.

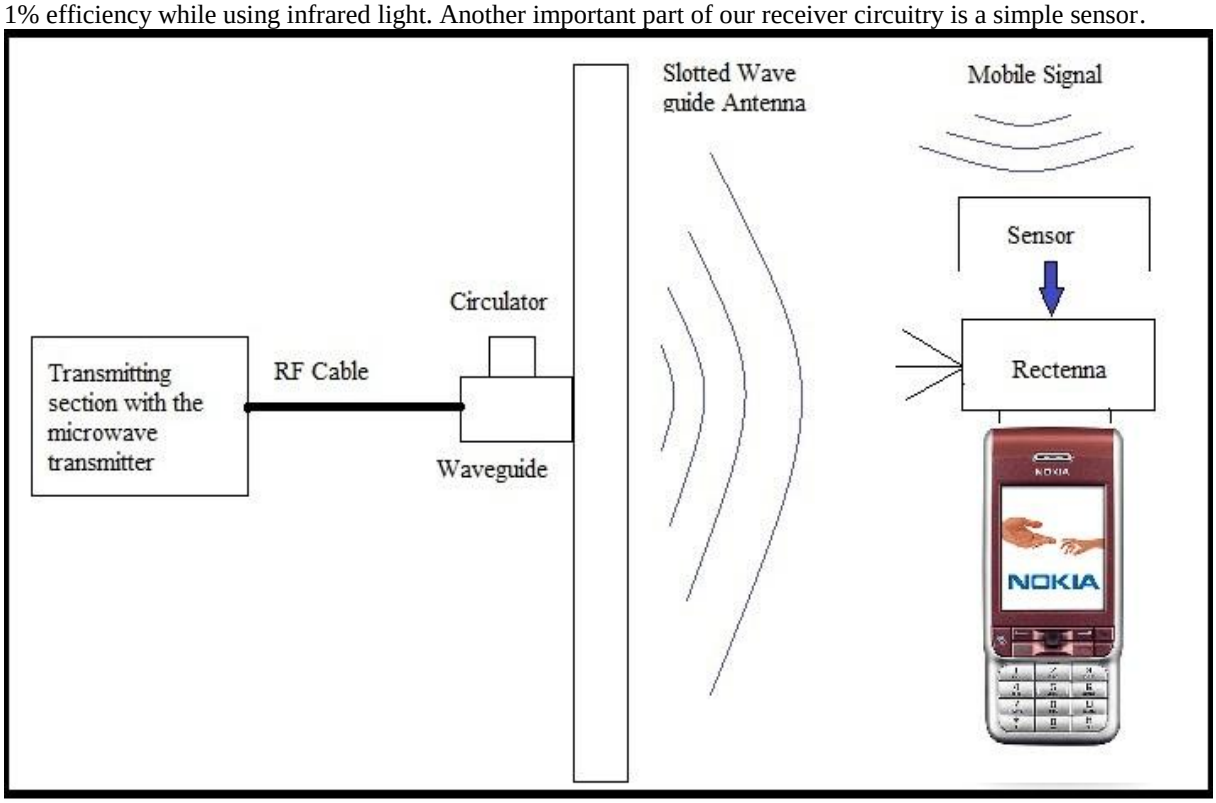

Fig.3: Block Diagram of full operation

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The sensor circuitry is a simple circuit, which detects if the mobile phone receives any message signal. This is required, as the phone has to be charged as long as the user is talking. Thus a simple F to V converter would serve our purpose. In India the operating frequency of the mobile phone operators is generally 900MHz or 1800MHz for the GSM system for mobile communication. Recentness will be used to generate large-scale power from microwave beams delivered from orbiting SPS satellites.

III. LIMITATIONS

The Mobile Handset should additionally have a device, "Rectenna" which would make it bulky and hence device size up to molecular level is essential. The main disadvantages of wireless charging are its lower efficiency and increased resistive heating in comparison to direct contact. Implementations using lower frequencies or older drive Technologies charge more slowly and generate heat within most portable electronics. Due to the lower efficiency, devices can take longer to charge when supplied power is equal.

IV. INDUCTIVE CHARGING

Though some Handsets on the market currently provide wireless charging, the technology is not exactly same as mentioned here. For charging, phones are required to keep near the Charging Plate. It uses inductively coupled Power Transfer System.

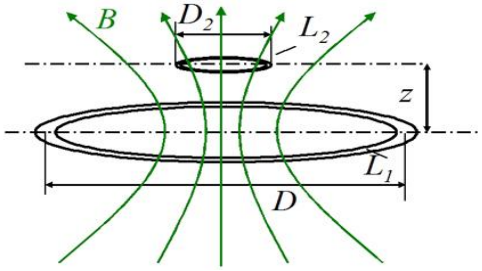

Fig. 4: Existing Power Transfer system

Nokia Lumia 920(A T&T) **HTC Windows Phone AX** **Nokia Lumia 822(Verizon Wireless)**

Fig. 5: Mobile Phones Using Power Transfer Charging System

A transmitter coil is positioned at the bottom (L1) and the receiver coil (L2) is situated at the top and these coils are embedded into different electrical devices. L1 would be the Nokia Wireless Charging Plate and L2 would be the Nokia Lumia 920, for example. In coming days, Microwave might fix various issues in the current system.

V. CONCLUSION

In this modern era of Science and Technology, we do not have enough time to be constantly at one place and recharge our Mobile Phones, Laptops etc. Regardless of office, we work even when we are at home, then our Communicating media need sudden recharge without being interrupted. A novel use of the Rectenna and a sensor in a Mobile phone could provide a new dimension in the revolution of Mobile Phone. Covering these aspects, this new system of wireless recharging will certainly bring innovative Change in recharging Electronic Equipment and will upgrade our Lifestyle. Thus this paper successfully demonstrates a novel method of using the microwave's power to charge the Mobile Phones.

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