

Wireless Charging of Mobile Phones using Microwaves

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I. INTRODUCTION

A. MOBILE PHONE CHARGING – In A New Way Always the recharging of mobile phone batteries has always been a problem for us.



This problem will be solved after this proposal...!! We are going to add just a rectenna & a filter to the ordinary mobiles during manufacturing time... Thus the more you talk, the more is your mobile phone charged!!!! This is very new isn't it?!!

B. THE ELECTROMAGNETIC SPECTRUM

Microwaves are good for transmitting information from one place to another because microwave energy can penetrate haze, light rain and snow, clouds, and smoke. Shorter microwaves are used in remote sensing. These microwaves are used for radar like the Doppler radar used in weather forecasts. Microwave radiation is still associated with energy levels that are usually considered harmless.

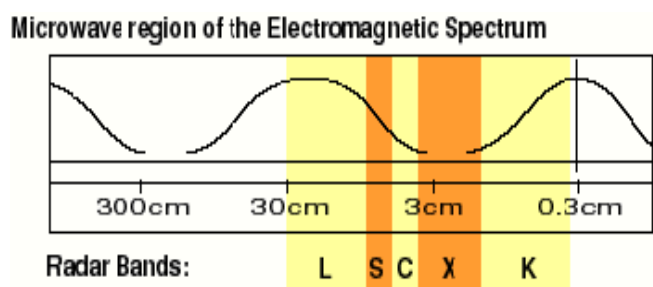


Fig1.Microwave region in EM spectrum

II. TRANSMITTER DESIGN

- 1) The MAGNETRON is a self-contained microwave oscillator that operates differently from the linear-beam tubes, such as the TWT and the klystron.
- 2) Magnetron is used to produce high-power output required in radar and communications equipment.
- 3) Microwaves used in mobile communication are also produced by similar Oscillators.

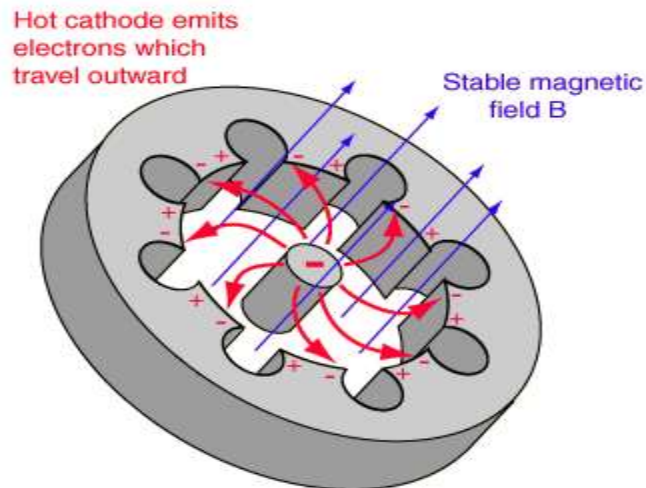
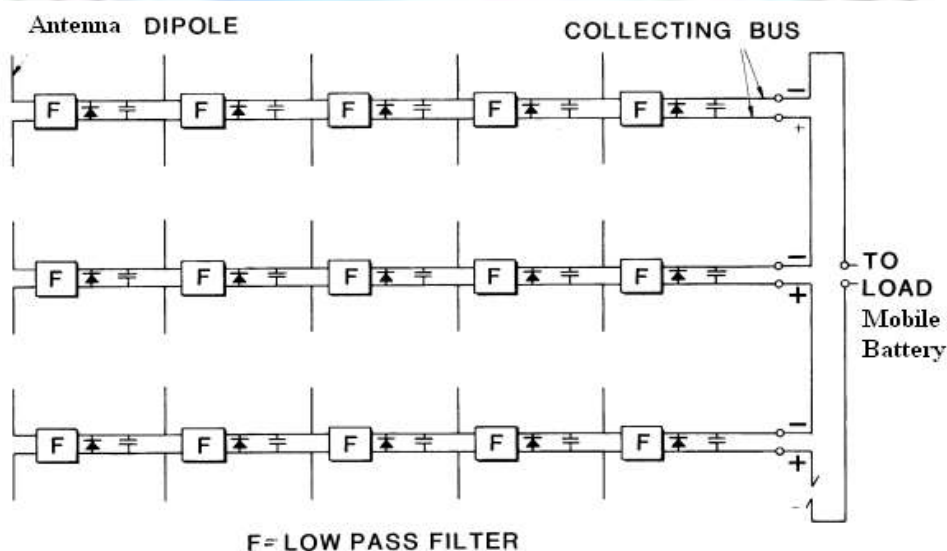


Fig 2. The above fig. shows magnetron

III. RECTENNA

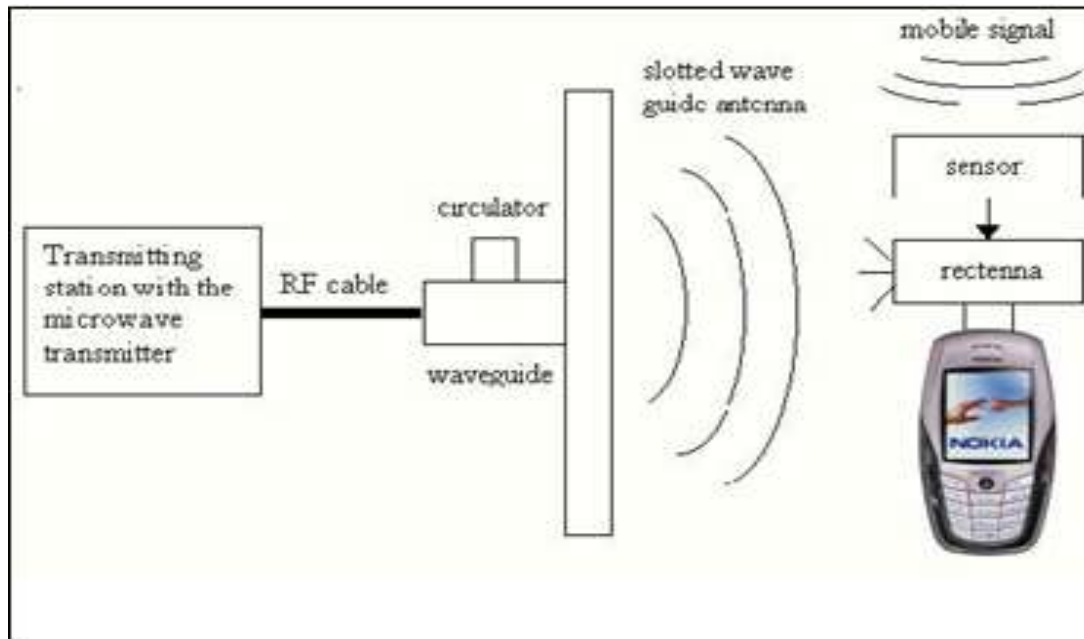
Rectenna ...it's nothing but the combination of rectifier and antenna. Antenna is to receive the microwave signal and it just feed the signal to rectifier. Rectifier is to convert the ac signal to pulsating dc signal.



Above fig.3 Shows the process of rectification.

IV. RECEIVER DESIGN

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. 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.



The above fig. 4 shows the receiver design

V. WHY SCHOTTKY DIODES???

- 1) Schottky diodes can achieve greater switching speeds than p-n junction diodes, making them appropriate to rectify high frequency signals.
- 2) Schottky diodes are made of single type of doping material, hence based of the major carrier conduction mechanism enabling high frequency switching.(Microwaves are of High Frequency .
- 3) Though it consumes more power than any other, it suits our application and provide higher efficiency (double).

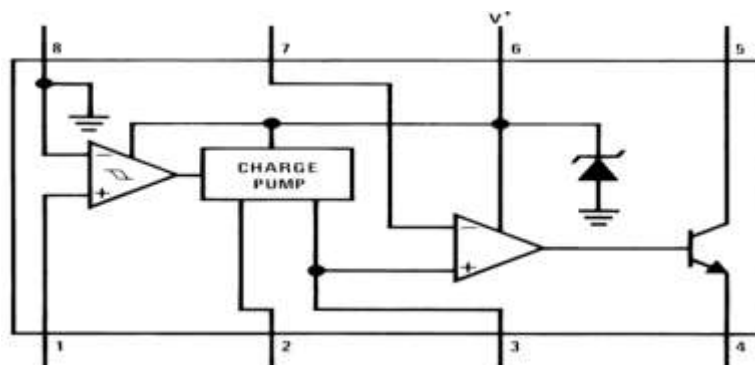


Above fig.5 shows Schottky diode 1

VI. SENSOR CIRCUIT

- 1) In India the operating frequency of the mobile phone operators is generally 900MHz or 1800MHz for communication.
- 2) LM2907-a simple n F to V converter used as it operates between this specified range , would serve our purpose.

- 3) F to V would act as switch to trigger the rectenna circuit to ON and the mobile phone begins to charge using the microwave power automatically.
- 4) This is required, as the phone has to be charged as long as the user is talking.



The above fig. 6 shows the circuitary of sensor.

Conclusion

This novel idea minimizes the tension of charging your mobile phones regularly. -No necessity of Chargers accompanying the mobile phone -Efficient use of energy transmitted in the form of microwaves.

Future scope

The wireless charging can even be done using the data exchange as now only its only been implemented for voice calls. With the advent of nanotechnology and MEMS the size of these rectennas can be brought down to molecular level. 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.

References

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