

# International Journal of Innovative Research in Science, Engineering and Technology

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## Energy Efficient Green Radio Technology in Wireless Network

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**ABSTRACT:** Green radio technology prefers environment friendly approach towards the mobile communication. This project developed for modification in mobile infrastructure for energy conservation and CO<sub>2</sub> reduction(carbon credit). The mobile towers are increasing in an extraordinary manner. The source for towers are based on the power requirement. Power requirement in developing countries are always greater than the generated. A critical mobile network consume ~40-50MW and a diesel generator consume ~1MG of diesel per day. Our objective is to reduce the energy consumption in base stations.

### I. INTRODUCTION

As part of the international efforts for energy conservation and CO<sub>2</sub> reduction, migration to an energy-efficient mobile infrastructure is of high importance to the mobile communications industry. For network operators, energy efficiency is much more than a corporate social responsibility topic — it will be one of the key factors for successful operation of large-scale mobile communication services.

Due to the tremendous upswing of mobile Internet access demand, the cellular wireless system is currently transitioning to LTE. This next-generation mobile infrastructure provides broadband access and enables new classes of applications for mobile users.

With the emerging traffic demand, mobile operators are under pressure to enhance their infrastructure in a competitive time frame. However, the investment to enhance the infrastructure does not always pay off because the average revenue per connection continues to decrease, as shown in Figure 1. To overcome such a price-pressure trend, energy saving is one of the key subjects for mobile operators' total cost of ownership reduction. Because the base station accounts for most of the energy consumption by mobile operators, improving the energy efficiency of base station key components, such as power amplifiers and air conditioners, is of great importance.

Another driver for an energy-efficient mobile infrastructure is corporate social responsibility for international efforts against climate change. By deploying energy-efficient base stations, operators can reduce the CO<sub>2</sub> emission from their network. Vendors can contribute to the efforts against climate change by providing technologies that lower network equipment's power consumption. In the lifecycle of a base station, power consumption is more dominant in the deployment and operational phase than in the production phase. Therefore, ease of deployment and low-power operation are critical for an energy-efficient mobile infrastructure.

Independent of the actual energy source that is used for powering the access network achieving the highest possible energy efficiency is very important. This applies to conventional, grid-powered network elements in larger cities as well as (and often even more so) to, for example, solar-powered base stations in developing countries without reliable grid-based energy. Effective energy management is thus a key requirement for successful and profitable operation of mobile communication networks.

### II. EXISTING SYSTEM

In the existing system all mobile towers are kept on in a particular locality irrespective of the number of users. As a

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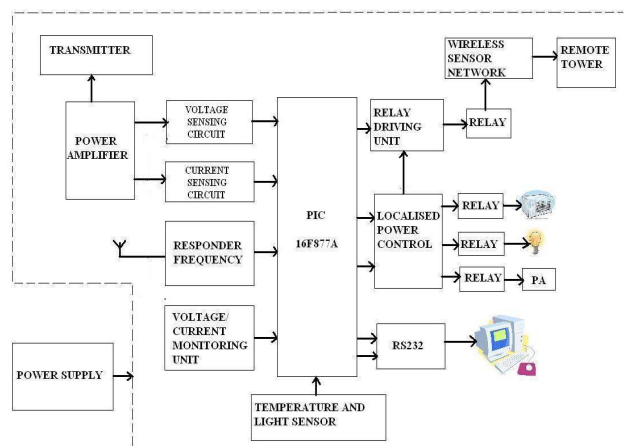
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result high power consumption occurs. A typical mobile phone network may consume approx 40-50MW, even excluding the power consumed by user's handsets. When direct electricity connections are not readily available, these service providers use diesel to power their network. As a result, a polluted environment is established and a whole of about 1% of the total power generation is being consumed by the mobile networks itself. In addition to this the lighting and cooling units are always in on state thereby considerably increasing the power consumption rate day by day in INDIA more than 5 lacks towers are present. Till 2014, 11lacks towers will be increased.

Also Tamilnadu Govt., going to Stop the launching new Mobile Towers in Tamilnadu Towers will be always ON. The power consumption increased so that carbon emission also increased One tower delivers 85kg of carbon/ day During night time for the 10% of users 100% towers are kept on. This leads to inefficient mobile towers.

### III. PROPOSED SYSTEM

In the proposed system power consumption rate is lowered by keeping only one mobile tower in working state to take up all communications while the remaining towers stay in idle mode. When the no of users of the current tower reaches a predetermined value say 80% the responder frequency is sent to the nearby efficient tower to take up the remaining load by means of wireless sensors networks. Thus by keeping all the towers in idle state and by keeping only one in working state the power consumption rate is considerably decreased. Moreover with the help of ambient analyzer maximum power saving is achieved by means of localized power controller where the lighting and cooling units are turned on as per the requirement. Fuel level monitoring unit is made available devoid of manpower. Thereby 1 KW power saved=2 KW power generated. Energy saving is one of the key subjects for mobile operators because the base station accounts for most of the energy consumption by mobile operators. Our government is losing Rupees 19.65/- per liter sale of diesel. The same cost is applicable for mobile tower Directly and indirectly mobile operators are creating huge lose to the society by wasting power. Power consumption is reduced by adapting the provided network capacity to the actual demand at a given time. We have to set towers based on the peak and off peak hours. When off-peak hours the most of the towers in sleeping mode. So that energy consumptions is takes places. Operating energy is reduced so that the carbon emission also reduced considerably



### IV. HARDWARE IMPLEMENTATION

#### POWER SUPPLY UNIT

As we all know any invention of latest technology cannot be activated without the source of power. So in this fast moving world we deliberately need a proper power source which will be apt for a particular requirement. All the electronic components starting from diode to Intel IC's only work with a DC supply ranging from  $\pm 5v$  to  $\pm 12v$ . We are utilizing for the same, the cheapest and commonly available energy source of 230v-50Hz and stepping down, rectifying, filtering and regulating the voltage. This will be dealt briefly in the forth-coming sections.

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## STEP DOWN TRANSFORMER

When AC is applied to the primary winding of the power transformer it can either be stepped down or up depending on the value of DC needed. In our circuit the transformer of 230v/15-0-15v is used to perform the step down operation where a 230V AC appears as 15V AC across the secondary winding. One alteration of input causes the top of the transformer to be positive and the bottom negative. The next alteration will temporarily cause the reverse. The current rating of the transformer used in our project is 2A. Apart from stepping down AC voltages, it gives isolation between the power source and power supply circuitries.

## RECTIFIER UNIT

In the power supply unit, rectification is normally achieved using a solid state diode. Diode has the property that will let the electron flow easily in one direction at proper biasing condition. As AC is applied to the diode, electrons only flow when the anode and cathode is negative. Reversing the polarity of voltage will not permit electron flow.

A commonly used circuit for supplying large amounts of DC power is the bridge rectifier. A bridge rectifier of four diodes (4\*IN4007) are used to achieve full wave rectification. Two diodes will conduct during the negative cycle and the other two will conduct during the positive half cycle. The DC voltage appearing across the output terminals of the bridge rectifier will be somewhat less than 90% of the applied rms value. Normally one alteration of the input voltage will reverse the polarities. Opposite ends of the transformer will therefore always be 180 deg out of phase with each other.

For a positive cycle, two diodes are connected to the positive voltage at the top winding and only one diode conducts. At the same time one of the other two diodes conducts for the negative voltage that is applied from the bottom winding due to the forward bias for that diode. In this circuit due to positive half cycle D1 & D2 will conduct to give 10.8v pulsating DC. The DC output has a ripple frequency of 100Hz. Since each alteration produces a resulting output pulse, frequency = 2\*50 Hz. The output obtained is not a pure DC and therefore filtration has to be done.

## FILTERING UNIT

Filter circuits which are usually capacitors acting as a surge arrester always follow the rectifier unit. This capacitor is also called as a decoupling capacitor or a bypassing capacitor, is used not only to 'short' the ripple with frequency of 120Hz to ground but also to leave the frequency of the DC to appear at the output. A load resistor R1 is connected so that a reference to the ground is maintained. C1R1 is for bypassing ripples. C2R2 is used as a low pass filter, i.e. it passes only low frequency signals and bypasses high frequency signals. The load resistor should be 1% to 2.5% of the load.

## VOLTAGE REGULATORS

The voltage regulators play an important role in any power supply unit. The primary purpose of a regulator is to aid the rectifier and filter circuit in providing a constant DC voltage to the device. Power supplies without regulators have an inherent problem of changing DC voltage values due to variations in the load or due to fluctuations in the AC line voltage. With a regulator connected to the DC output, the voltage can be maintained within a close tolerant region of the desired output. IC7812 and 7912 is used in this project for providing +12v and -12v DC supply.

## V. SIMULATION RESULTS

It is one of the first languages to support event driven programming a style of program especially suited to graphical user interface. The aim in modern computer application is to have the user in charge.

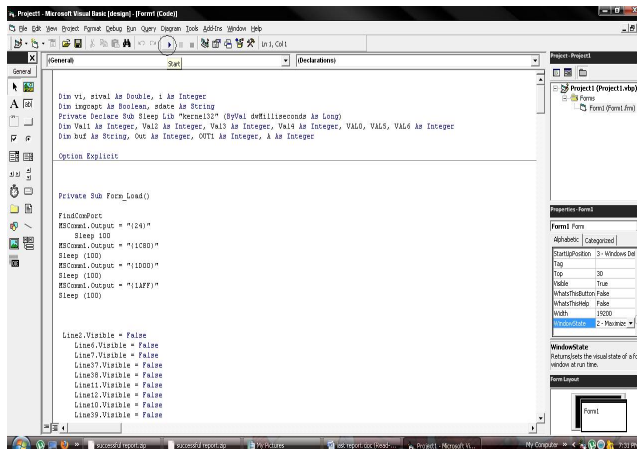
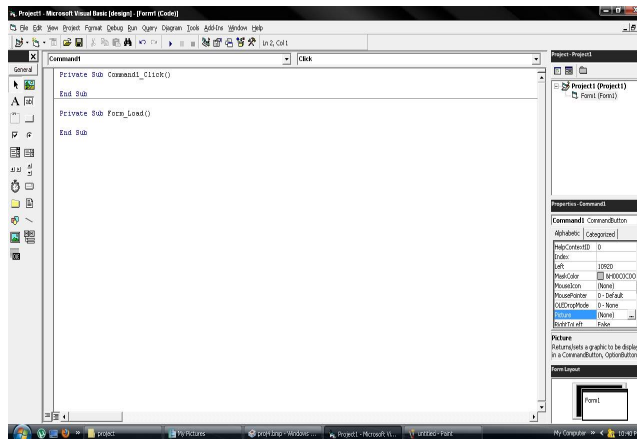
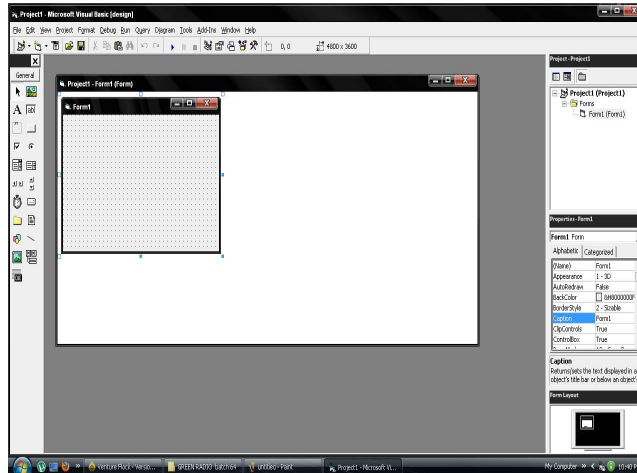
A data base creation tool. Visual data access with the data control so that it is possible to create data browsing application without writing code. A new OLE (object linking and embedding) control that allows in place editing. A collection of common dialog boxes that streamline common user interface tasks. The ability to create pop-up menus anywhere in the application.

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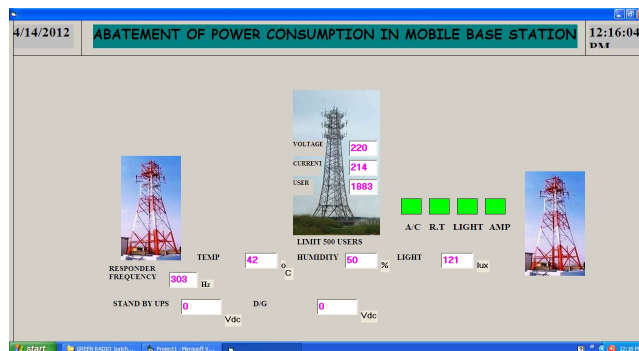
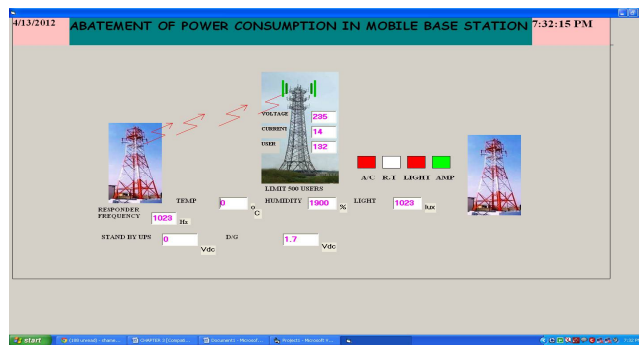
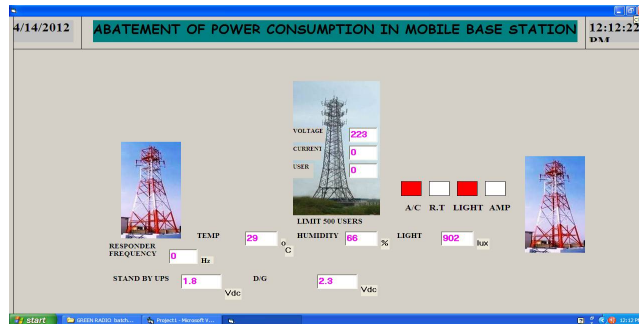


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## FRONT END SYSTEM



## VI. CONCLUSION

The objective of the project is to design, simulate and assemble a microcontroller based energy saving unit so as to reduce the power consumption in the existing mobile base stations. Since cooling unit are found to be most energy craving part in the BTS, its power consumption has to be reduced, this is done in our project by sensing the climatic condition and by using a relay to control the cooling unit. To amplify signals, power amplifiers are used, here we sense the power amplifier voltage and current and through this, number of users utilizing a particular tower is destined. When there is no requirement of too many towers acting at the same instant, while a single tower itself can handle the load, the remaining towers are put into a power saving mode. This is visually brought in front end using VB software.

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