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Maximum Efficiency of Mobile Cellphones in Shadow Zone

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Abstract:*A mobile is an electronic device by which we can communicate with another person over a distance by making or receiving calls over a given radio link of given bandwidth while moving around a wide area. It is done by connecting with a cellular network, provided by one of our cell phone operator, allowing access to PTN. The traditional way of transferring mobile signal, mostly depends upon satellite communication or by ground wave communication. We find many difficulties in transferring signals through this process, as it is less efficient and creates blank spots at many places due to obstacles which are increasing in number day by day.*
We are presenting an idea to enhance the signal, thus enhancing the overall working efficiency and signal quality of a cell phone through wireless medium by the use of high frequency signals emitted by nano-chip consisting of a transmitter and a receiver. They are only affected by noise which can be removed easily by the help of a filter circuit.

I. Background:

Nano-technology is a combination of Physics, Chemistry, Biology and Electronics. Electrical, Mechanical and Chemical engineering are also getting involved in this new field of nanotechnology. It can be said that nanotechnology is the creation of functional devices, materials and system by controlling the size at the scale of 1 – 100 nanometers. Nanotechnology has already entered in the electronics industry and is now offering features in microprocessors which are less than 100 nanometers (nm) in size. Smaller size in electronic circuits, allow faster processing time and also more processing power to be packed into a given area. Nano-electronics increase the capability and working efficiency of electronic devices by reducing their weight and power consumption.

From 1983 to 2014, worldwide mobile phone subscriptions grew from zero to over 7 billion, penetrating 100% of the global population and reaching the bottom of the economic pyramid. Mobile phones are using satellite communication method for transmitting and receiving signals. For better Communication quality, more and more number of cellphone towers are now occupying large amount of space in every city and town, which is not only a wastage of land but also a huge waste of money. According to a survey, $1000 million are spent every year just to increase the quality of cellphone communication network and around 1731 sq. mile of area is used every year for the same.

Cellular networks and mobile phones vary from geographical locations and providers to providers, but still standard communication methods are more or less same everywhere. Basic communication takes place using electromagnetic microwaves with cellular base stations. Cellular networks have huge antennas normally located in the middle of certain area to provide optimum signal broadcasting. These antennas are known as Base Transceiver Station (BTS). Mobile handsets have low powered transceivers which transmit voice data to the closed BTS which can usually be within 5 to 8 miles radius. Transceivers: Transceivers are devices which have capability of transmitting and receive data at the same time.

II. Present scenario:

Mobile technology has already created a hype throughout the world. Most of the features provided by this technology were once a far fetched designs. How are all these amazing features working so well? We are using SMS, which deliver messages in seconds throughout the world with just a little tap of a button "Send", MMS, sending pictures and video files promptly, finding locations, accessing high speed internet in your mobiles are the features which were not possible just few years back.

Today, mobile networks supports features likes SMS, GPRS, MMS, Email, Bluetooth, WAP almost on any cellphone. Most of the networks worldwide provides these features. Mobile phones of today's age are now equal to portable PCs. These mobile phones connect to their cellular networks and these cellular networks are connected to Public switching telephone network (PSTN). Almost anything and everything is possible to do with a cellphone this days.

In the traditional way of communication, a cell sends the signal via transmitter to the receiver, attached to the tower. As soon as the tower receives the signal, it send it to the satellite which then amplifies the signal

and sends it back to the tower, nearest to the cell phone receiver. As the receiver receives the signal it sends it back to the desired receiver.

The main problem about this process is about the radio waves, those which are near the ground do not travel over a single well-defined radio path as in free space, they get scattered against reflecting surfaces which act as an obstacle in the propagation pathway of the mobile antenna. Reflected radio waves may add destructively, causing the signal to disappear or become heavily weak or attenuated at certain locations. A moving user of cell phone, i.e. a mobile in motion, receives such resulting signal which is frequently varying in time. This effect is called `shadow effect'.

This Shadow effect causes many problems like call drop, loss of network and loss of internet services. Around 30 percent of cell phone owners face this problem everyday while traveling, from one place to other. But what if we change the way or method of communication?

Summary:

Nano trans-receiver is an electronic circuit that will work bidirectional i.e. transmitter of one circuit sends information and the receiver of another circuit receives the information, process it, then send the processed information again via transmitter to the receiver of the first circuit. This whole transmission and receiving of signals occur between two cell phones and it will eliminate the requirement of large number of towers, for propagation and transmission of signal. If two mobile phones are nearby and in predefined range and one of it is in the shadow zone, the chip will automatically communicate with the other nearby chip and use a part of signal of other cell to maintain the network without disturbing the network of host phone.

Mobile handset registers itself at mobile network, switch or exchange as soon as it find itself in shadow zone and starts transmitting, usually it means when chip of the mobile in shadow zone turn on, it tries to register to the network of inserted SIM card and try to locate another cell which is not in shadow zone. Mobile networks uniquely identify each and every registered mobile handset on the given chip and sends notifications to those mobile handsets which have incoming signals. Handsets will always be registered to the most nearest BTS (base transceiver station) for communication, incase if user of the network is on move, mobile phones in this case will handoff to the closest BTS during the call and keep the connection alive with nearest base stations. Same principle goes with this chip, it continuously find the closest available cell and automatically establish a connection with it, without destroying the host's signal.

The use of this Nano trans-receiver chip allows for an increase in signal efficiency of seventy to eighty percent over comparable efficiency of the cellphone in shadow zone. Point to point transmission, stronger transmitter and receiver operating at the same time as bidirectional communication system combined with minimum loss of energy, make the overall system efficient. This chip allows the cellphone in shadow zone to connect with another signal band, with the help of transmitter and receiver present in it, by communicating with another chip present in its range.

To make it, Cadmium selenide Nano crystals along with Aluminum nanoparticles deposited on plastic sheets have been used to form flexible electronic circuit. To make it better than the other electronic circuits, we are using Silicon Nano photonics components into CMOS integrated circuit. This optical technique is used to provide higher speed data transmission between integrated circuits than the electrical signal.

Detailed Description

Nanoparticles of cadmium selenide are surrounded by a capping layer of another material that acts as a protective layer of the nanoparticle and it protect it from the environment. Aluminum nanoparticles are used here because of their super conductive nature. Nano trans-receiver is an electronic circuit on a chip of size about 100 nanometers (nm) which consist of high power transmitter and a high power receiver.

The work of the transmitter is to transmit a signal and search for a nearby device whenever the cell phone is experiencing a low network. Once the transmitter detects another device, it automatically connects with that device to regain its signal strength. As soon as the device experiences the original signal it will automatically release the connection from the other device.

This nano chip can be introduced in the mobile phone at the time of manufacture and can also be planted after that. The cost of the chip will be very low if planted while manufacture because of the bulk production of the chip.

Making of Nano trans-receiver on large scale requires use of large amount of cadmium selenide which is very toxic in nature and it can cause cancer to a human which is the main problem behind using cadmium selenide but capping it will minimize the effect. Secondly, making of electronic circuit at this small dimension requires a great attention, skill and knowledge of the working system. For effective use, maximum cellphones should have nano trans-receiver.

To solve this problem, High precaution should be taken while working with cadmium selenide and a suitable user manual should be provided about the careful use of cadmium selenide. Secondly, for implementing

maximum number of Nano trans-receivers in cellphones, cellphone companies should implement this electronic circuit at the initial stage so that people don't have to buy it after purchasing the cellphone.

The use of Nano trans-receiver will not only helps improve signal quality but also helps reduce call drop problem and slow down the increasing cost of improving signal quality of the cellphone companies. It also save a lot of money as well as space for other things and also increase the efficiency of a mobile phone.

Description of Diagram

Figure 1: Shows the conventional way of satellite wireless communication. Transmitter of cell phone sends the signal to the cell phone tower, cell phone tower than sends the signal to the satellite which than amplify it and send it back to the cell phone tower. All this process is bidirectional i.e. one can send and receive the signal by the same source and at the same time.

Figure 2: Shows the working of the nano trans-receiver. Front end of the chip act as the receiver and will receive the signal and send it to the other component of the mobile and back end of the chip act as the transmitter and will transmit the signal.

Figure 3: Shows the approximate size of the nano chip i.e. 100 nanometers (nm). It is so small and can be easily implemented in the mobile phone.

Diagrams:

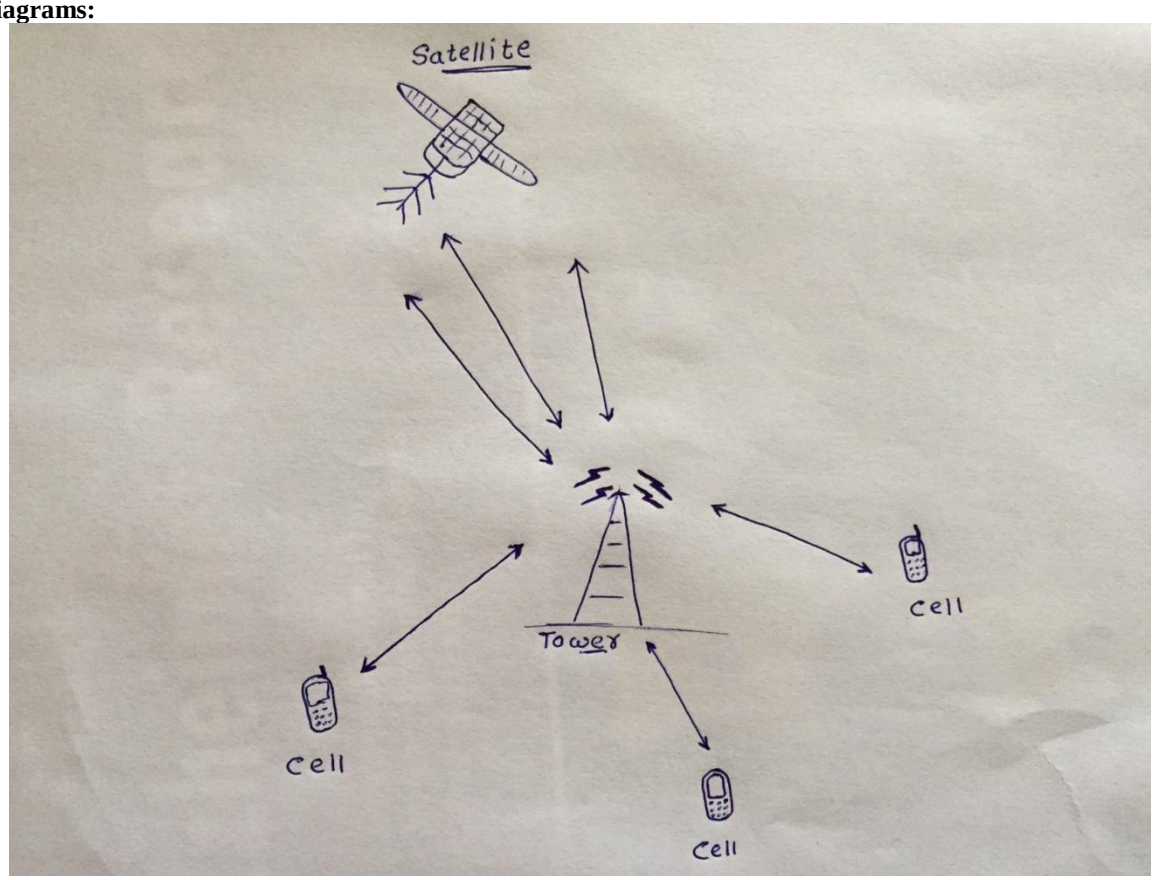

Figure 1

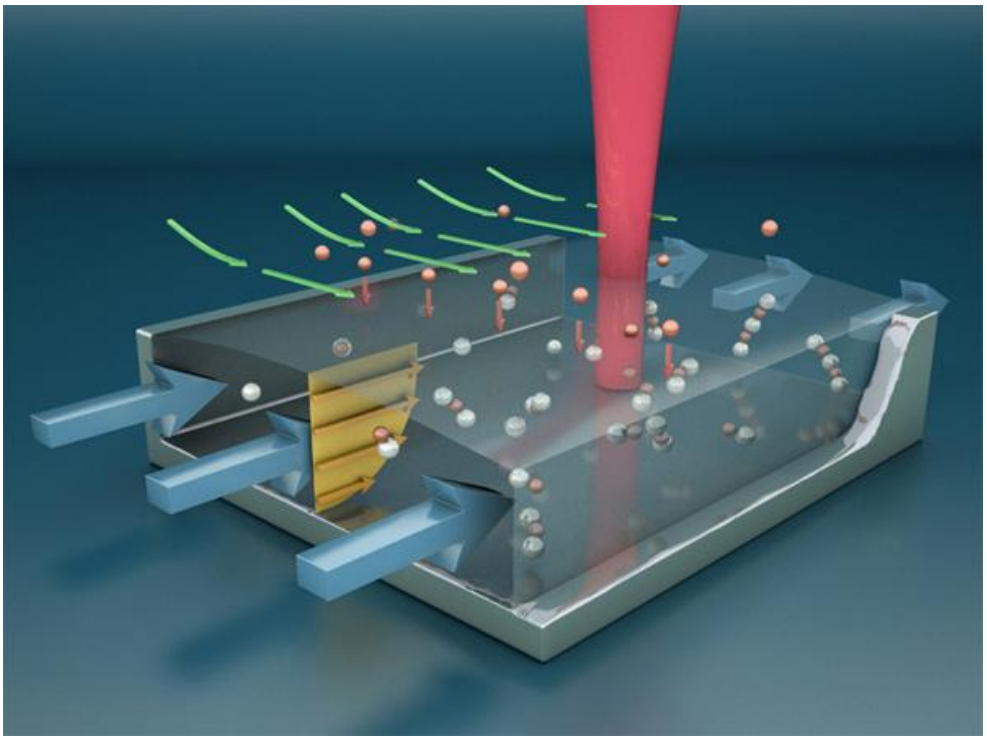

Figure 2

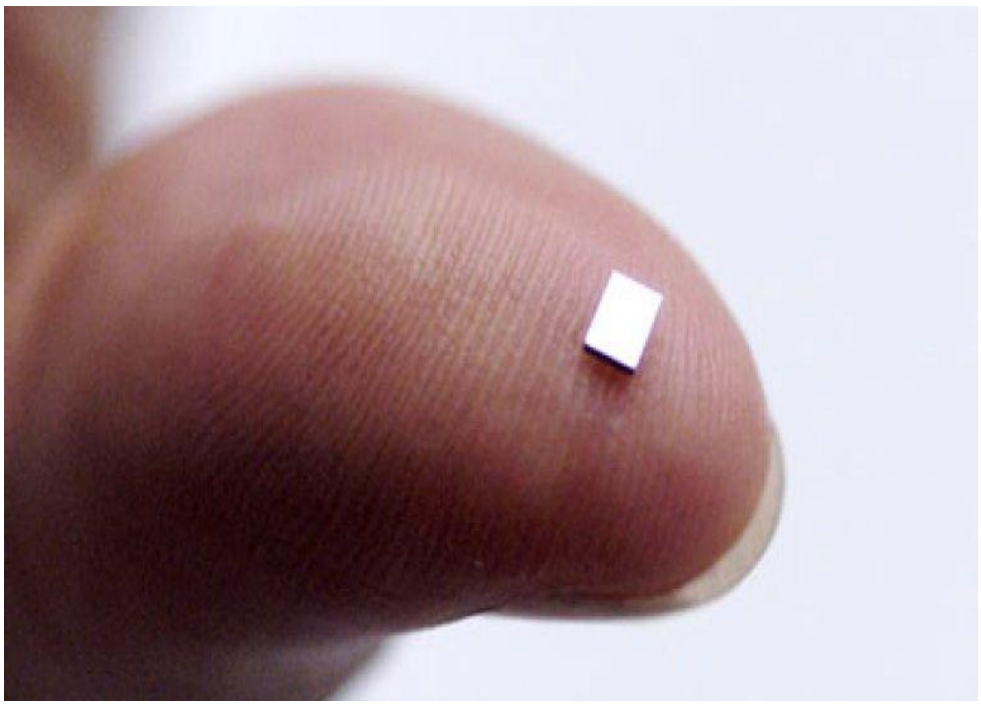

Figure 3

Citation

- http://www.techcrates.com/transfer-ios-apps-between-devices/ (figure 4)
- http://www.wirelesscommunication.nl/reference/chaptr02/issues.htm
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- http://en.wikipedia.org/wiki/Nanotechnology