4G Signal Booster

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Abstract. A system which is capable of or adapted for turning easily from one to another of various tasks, fields of endeavor have been evolved since 1980’s as time changes everything is of higher execution, higher limit and simplicity of getting to from anyplace on the world. There is a fast progression in remote correspondence innovation giving the system benefits anyplace and at whatever time 4G correspondence frameworks are being created to take care of the different issues the present correspondence frameworks (3G, 2.5G) are facing. In this paper we give a simple booster which works on the present network 4G. We talk about the innovations that exist in market and can be utilized to upgrade the system data transmission and execution of the right now living innovation in the market. Some of regions were ineffectively secured by wire line gadgets because of significant expense. 4G will be a canny innovation that will decrease the quantity of various advances to a solitary worldwide standard. This would lead to more efficient 4G mobile networks. As previously used Specifically, An artificial intelligent technique involving the use of Bat Algorithm (BA) and Artificial Neural Network (ANN) have been proposed. Nowadays everyone is preferred wireless then wired connection and everyone need wireless connectivity. It is trusted that this will fill in as a one-stop look for specialists and engineers in the significant field of remote sign promoters and extenders, who wish to realize what is accessible and existing difficulties.

1. Introduction

The time of remote framework had progressed from 1980's. Directly in the present day we can see more rapidly creating framework which is thought to comprehend the data correspondence with a speedier data rate and having far reaching framework scope around the globe. The season of remote framework started with unique (1G) towards 2G, 3G and 4G. A present survey in framework development advancement says that there will be enormous improvement in framework action by the year 2020. It is surveyed that number of supporters will create by 10 times and consistently there will be 100 times higher development in framework utilize [1]. There are more than 5 billion devices being utilized on the planet and it is well ordered extending well ordered.. Without range, no remote media transmission or remote web administrations would be conceivable. Radio invention is not psychological, it likewise incorporates a progressive change in how the range is controlled. Intellectual Radio and 4G are two reciprocal advancements that will reframe the universe of remote correspondences. 4G systems utilizing subjective radios are an answer that alters the media transmission industry, essentially changing the way
2. Literature Summary

This section represents the survey for classification from previous references. There are many planning and previous references that are given in order to develop a different set of parameters and different types of algorithms are used to perform different types of techniques are followed in order to get the required output in different ways.

2.1 Kevin Ming-Jiang Ho et al presented the impedance matching networks. It is seen that a tunable matching network can improve the cell phone system noise figure and total integrated sensitivity (TIS) by at - 1 dB at 700 MHz - 3 GHz. The reason is that a mismatched low-noise amplifier has a higher noise figure and a lower gain than a noise-matched LNA, and therefore, a tunable matching network is important for noise matching in receiver applications. The project calculations based on realistic cell phone assumptions showing that a tunable impedance network capable of matching an antenna VSWR of 10 to a VSWR of 2.6 will result in 1dB improvement in the system NF and total integrated sensitivity. This work was supported by the UCSD Center for Wireless Communications.

2.2 Elizabeth N. Onwuka This paper presented a survey of cellular signal boosters. It made a detailed overview of cellular boosters, highlighting its operation, and pointed out issues for consideration in antenna selection. It discussed the design and operational working principles, cost determinants, good and poor booster technologies. It specifically discussed boosters fit for local environments like Nigerian, and mentioned some basic booster specifications. Research efforts in booster design, deployment and analysis across the generations of mobile communications were outlined and briefly discussed. All of these culminated to a look at future work where a signal booster design for given local environment is considered appropriate.

2.3 Divvela Santhoshn the Tri-Band Cellular Repeater consists of Bidirectional amplifier, receiving and transmitting antennas. This paper discusses our assembling process, beginning with component selection and our difficulty in obtaining the required gain according to the user requirement in the process of testing. This cellular repeater can be operated in 3 different operating frequency bands namely, GSM 900, DCS and 3G. Hence, practically also proved the importance of repeater in enhancing the signal. Finally, we conclude by saying that repeaters can improve the signal strength in low signal coverage areas to such an extent that everyone can receive signals without having any disturbances.

2.4 Salihu Oladimeji The design, implementation, and testing of a GSM signal booster was carried out. The signal booster works in both the 900 and 1800 MHz bands. It was successfully tested on the four mobile networks available in Nigeria. The GSM signal booster achieved a maximum percentage boost of 73.59% on 2G network for which it was designed. In situations where the signal is in a deep fade such that no signal is received by the outdoor antenna; the booster will not boost. However, as long as
there is available signal, not less than the sensitivity of receiving antenna, the booster will pick it up and boost it for mobile stations’ reception

3. Existing System:

   Telecommunication is increasing day by day by increasing the functions in telecommunications the disadvantage are mainly there are two types of disadvantages they are radiation and signal breakdown. The radiation is big problem in telecommunication sector. We want to fix the problem of radiation. The signal strength has to be decreased. If the signal strength is decreased the message signal strength did not have more capacity to travel longer distance apart of this problem.

   ![Fig 3.1 Existing System](image)

   There is another problem which telecom operator proposed some solution to fix this one [5]. The problem is signal strength decreases when it travels to longer distance so what telecom operator did is they increase the cell size so that the area present in the cell have the chance to get high capacity of signal. Even through if the number of users are high the signals automatically distracted so that high capacity of antenna are used to receiving end to get signal. The existing system which was done by telecom operator are increasing cell size

4. Methodology:

   The signal is coming from the towers are high intensity so that by using Radio Frequency circuit it should be converted to the low intensity signal next it will send to be Band pass filter so that 4G bandwidth range signal are transferred to the power amplifier now power amplifier is used to amplify the signal so that the data present in the signal is recreated from that antenna transmits the signal at the destination path.

5. Proposed System

   In communication by improving the telecommunication department by improving in the communication field there are many disadvantages mainly the radiation. Now from the earlier stage the telecommunication department faces a lot of problems especially the message signal transfer for longer distances. In India the telecommunication sector is trying to reduce this problem by increasing the frequency where there is a chance for the signal to travel long distances. By increasing the frequency means stringing the signal which leads to radiation. So the telecom sector decides the bandwidth range in the form of generations. There are 2G,3G,4G, LTE mode [3], [7]. At present we were in the 4G generation. In India, there are mainly 5 telecom operator namely, Airtel, BSNL, IDEA, JIO, Vodafone. Now coming to the point these 5 telecom operators are going to give the bandwidth. So Telecom Regularity of India has decided the 4g ranges and gives the tender, bids to these operators. As the signal decreases due to longer distances or a more number of users So this point of the era is raised in the operators. So they increased the cell size.
Fig 5.1 Proposed System

For a large range of areas a strong signal is providing by the operators. Even though there is a problem the thickness of wall increases leads to weakening the signal. To this a large definition of an antenna is used. It is difficult to implement. So at that time there is where the implementation of the booster arrived [6], [8].

These are less costly, less radiation, easy to implement, no need to study how to use this. As the name indicates it’s boosting the message signal. The message signal from the operator is come to our receiving point due to the wall density there is a disturbance in the call or damage the message signal or weaken the signal. So an antenna is equipped in the terrace which is mainly used to collect the signal from the antenna [10]. Now the collected signal is weakened so that it undergoes some steps to back the original signal. Here the antenna which we used in the boosters is patch panel antenna. The main advantage of this antenna is Omni directional which means it collects the signal from any direction that’s the main advantage of the antenna. It is less cost and lightweight. The collected signal from the antenna sends to the RF circuit. The RF circuit is used due to the high energy message signal is converted to a suitable powered signal [5], [9]. At last the recovered signal is again converted to the high energy message signal by using another RF circuit. The Bandpass filter is used to detect the range of 4G. Here there are so many signals so that we were designing the 4G signal booster so that it only collects the 4G range bandwidth signal. At last, the power amplifier is used to amplify the weak signal so that it back to the original signal now this message signal makes to original strong signal [11].
6. Results and Discussion:

The circuit which is tested in two locations. The Location 1 (shollinganallur) signal strength status before and after boosting of different telecom operator.

| Network Provider | Signal Before Boosting (-dBm) | Signal After Boosting (-dBm) |
|------------------|-----------------------------|-------------------------------|
| AIRTEL           | 113                         | 105                           |
| IDEA             | 112                         | 109                           |
| BSNL             | 83                          | 79                            |

![Comparison Chart before and after boosting at first location](image)

Fig 6.1 Comparison Chart before and after boosting at first location

![BSNL signal strength status of the BSNL telecom operator at Shollinganallur location](image)

Fig: 6.2 BSNL signal strength status of the BSNL telecom operator at Shollinganallur location.
Analysis of signal strength status so from the above bar graph we concluded that the after boosting the signal strength is slightly varied.

The Location 2 signal strength status before and after boosting of different telecom operator.

| Network Provider | Signal Before Boosting (-dBm) | Signal After Boosting (-dBm) |
|------------------|-------------------------------|------------------------------|
| AIRTEL           | 98                            | 89                           |
| IDEA             | 97                            | 82                           |
| BSNL             | 96                            | 85                           |

Fig 6.3 Comparison Chart before and after boosting at second location

Analysis of Signal Strength Status So from the above bar graph we concluded that the after boosting the signal strength is varied.
Fig: 6.4: BSNL signal strength status of the BSNL telecom operator at Chemmenchery location.

| Network Provider | Signal Before Boosting (-dBm) | Signal After Boosting (-dBm) |
|------------------|-------------------------------|-----------------------------|
| 1 meter          | 89                            | 71                          |
| 5 meter          | 83                            | 74                          |
| 10 meter         | 82                            | 75                          |

IDEA

Fig: 6.5: Idea signal strength status of the IDEA telecom operator at Chemmenchery location.

6.1 Meter Range values of BSNL:

Fig 6.6 Comparison Chart before and after boosting for BSNL.
Analysis of meter range values so from the above bar graph we concluded that the after boosting the signal strength is varied.

6.2 **Meter Range values of IDEA:**

| Network Provider | Signal Before Boosting (-dBm) | Signal After Boosting (-dBm) |
|------------------|-------------------------------|------------------------------|
| 1 meter          | 86                            | 72                           |
| 5 meter          | 87                            | 76                           |
| 10 meter         | 89                            | 78                           |

![Fig 6.7 Comparison Chart before and after boosting for IDEA](image)

Analysis of meter range values so from the above bar graph we concluded that the after boosting the signal strength is varied

7. **Conclusion:**

By the above experiment, we have to conclude that the booster that works for all type of Telecom operators present in India. Mainly they worked for all 4G bands. Here the output can be obtained by your mobile phone signal status in that mobile strength has to change. Actually mobile strength is from -60dbm to -140dbm. -60dbm means the best signal, -140dbm means poor signal. From the experiment we concluded that the mobile strength has been decreased in value that means increased in the signal strength. If someone wants to continue the project the output has to be taken from CRO so that the exact increase of the signal strength has been observed. This experiment was done in the Chennai location. As part of the paper we concluded that the 4G signal booster has increased signal strength of the different Telecom operators in 4G range

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