

# Improving Mobile Signal Reception Strength Using Network Booster

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**Abstract—** *The major objective of the mobile signal booster is to enhance the reach of the signal to remote areas such as regions with thick walls, hilly terrains etc. The function of the mobile phone signal booster is to take an existing cell signal, typically found outside your home, office or vehicle, amplify the signal and then broadcast it to an area which has weak or no signal. A mobile phone signal enhancer system consists of an external antenna, a signal boosting amplifier unit and an internal antenna, with cables connecting all of the components.*

## I. INTRODUCTION

The Network Booster Circuit basically helps the service provider to rectify the poor signal service. It can be operated according to the user's convenience and requirement. This cellular repeater is economical as all the components used are of low cost and hence total cost has been integrated. It is user-friendly and eco-friendly. These are similar to the cellular broadcast towers used by the network providers for broadcasting, but are much smaller in size and are recommended to use for a particular building only. Modern cellular repeater amplifiers rebroadcast cellular signals inside the building. The systems usually use an external directional antenna to collect the best cellular signal, which is then transmitted to an amplifier unit which amplifies the signal, and retransmits it locally, providing significantly improved signal strength.

## II. PROJECTS DETAILS

### A. Pre Requisite:

1. **Dead Zone:** A mobile phone signal (or reception) is the signal strength (measured in dBm) received by the mobile phone from the cellular network (on the down link). Depending on various factors, such as proximity to a tower, obstructions such as buildings or trees, etc., the signal strength will vary. Most mobile devices use a set of bars of increasing height to display the approximate strength of the received signal to the mobile phone user. Areas where mobile phones cannot transmit to a nearby mobile site, base station, or repeaters are known as dead zones. In these areas, the mobile phone is said to be in a state of outage. Dead zones are usually areas where mobile phone service is not available because the signal between the handset and mobile site antennas is blocked or severely reduced, usually by hilly terrain, dense foliage, or physical distance.

A number of factors can create dead zones, which may exist even in locations in which a wireless carrier offers coverage, due to limitations in cellular network architecture (the locations of antennas), limited network density, interference with other mobile sites, and topography. Since cell phones rely radio waves,

which travel through the air and are easily attenuated (particularly at higher frequencies), mobile phones may be unreliable at times. Like other radio transmissions, mobile phone calls can be interrupted by large buildings, terrain, trees, or other objects between the phone and the nearest base station.

2. Antenna: The following antennas are most suitable for mobile communication: I. Directional and Omni-directional GSM antennas will be either directional or omnidirectional. Omni-directional antennas, also known as helical antennas, can receive signals from any direction. Directional antennas usually have more gain, that is, more sensitivity to signal, than omnidirectional antennas. Directional antennas accomplish this greater sensitivity because they are able to focus their energy patterns onto a smaller area than omnidirectional antennas. However, to receive signal, directional antennas must be pointed in the specific direction from which the signal is emanating.

### **I. Monopole Antennas**

Monopole antennas consist of a small pole placed upon a planar piece of metal or a series of wires radiated out from the pole. Monopole antennas are omni-directional in nature and have equal gain in all directions so that we can use it outdoor.

### **II. Yagi-Uda Antennas**

Yagi-Uda antennas, more often referred to simply as Yagi antennas, are directional antennas made up of a dipole element, a reflector dish and one or more director elements. Yagi antennas are much more complicated in design than most other types of GSM antennas.

## **III. MULTIBAND ANTENNAS**

Multiband antennas can also be used to pick up GSM signals. They are able to pick up many sorts of different signals, including the GSM frequency, which is usually the 800 MHz or 1900 MHz bands. Multiband antennas can come in many different models. Tri-band antennas can be tuned to pick up three different bands, while duo-band antennas can pick up two different bands.

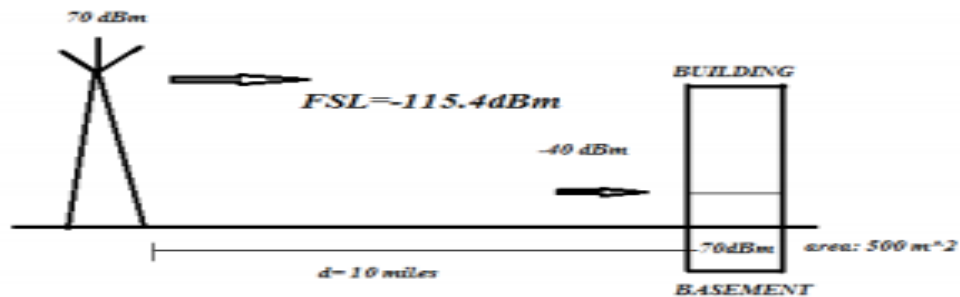
### **B. Description**

The major advantage of this system is that it enhances the applicability of mobile phones. Although mobile phones have got greater reach in today's world, the lack of cell phone signal still remains its major short coming. This Signal enhancer circuit will be useful in overcoming this demerit. In times of disasters, the cell phone signals become very weak. This system would enable communication even in times of crisis.

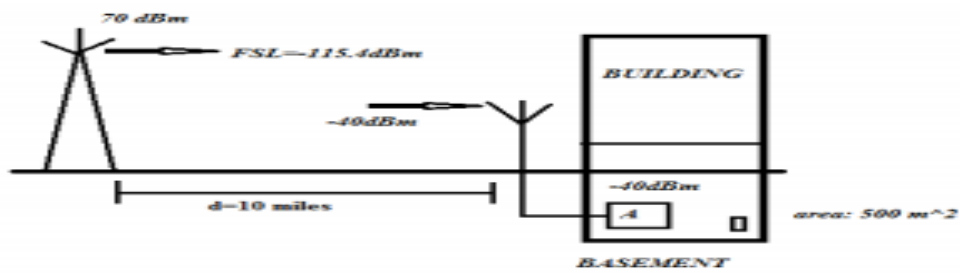
## **CELL REPEATER**

A cell repeater can also help in boosting reception. Made up of a few more parts than a femto cell, a cell repeater includes an antenna, an amplifier, and a coaxial cable that connects them. The antenna is placed either outside your building or on a window and then you can string the coaxial cable to the most convenient

spot to place the amplifier. Some cell repeaters include an additional indoor antenna, but many of them integrate that into the amplifier.



**Fig1. Signal without enhancer**



**Fig2. Signal with enhancer**

The antenna grabs a range of supported frequencies and then retransmits them with a stronger signal from the amplifier. When you make a call or use data when within the cell repeater's range, the indoor antenna picks up the signal from your mobile phone and transmits it through the outdoor antenna.

#### IV. RESULTS AND DISCUSSION

The main aim is to increase the strength of signal by designing a network booster circuit and analyze the performance to improve the signal strength. To overcome drawbacks of existing technology such as:

The High Cost of booster Antennas available in the markets. The booster antennas available in markets costs very high in dollars and are easily available in foreign countries. This adds to the cost of travelling or shipping the product to the user destination.

The reduced Mobile Signal Strength for long distance. This aims at increasing the number of access points but inspite of these there are some locations where the range is not available because of which we receive weaker signal strength.

We analyzed from our observations that signal can be enhanced in low coverage areas with the help of these boosters. We have observed the amplifications of Mobile Signal when booster is ON and OFF. 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.

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