Study and Improvement in Performance of SNR with Ring Choke Antenna using GPS

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***Abstract*—The global positioning system (GPS) has a capability to support a wide variety of application however multipath is dominant signal which cause fading and error in the received signal. This paper shows the multipath effects of signal strength in terms of Signal to Noise Ration (SNR) using GPS receiver. The observation for SNR is done in different climatic conditions and in different month of the year and a GPS multipath signal propagation model is presented. This paper we estimated multipath error and result were taken and analyzed with the different data collected from different locations of Jodhpur Region of Rajasthan India. By estimating and modeling of multipath with different antenna as a receiver of GPS can reduce the effect of multipath fading.**

Keywords — GPS, Carrier Phase Multipath, SNR, Ring Choke.

I. INTRODUCTION

All Global Positioning System is used to simplify accurate navigation Problem, GPS is a radio based navigation system that gives three dimensional coverage of the earth 24 hours a day the system is reliable and accurate. The GPS is an earth orbiting-satellite based navigation system. It is well known from the study that multipath error is one of the major sources of error affecting the positional accuracy of GPS,although, its effect can be reduced by choosing sites without multipath reflectors or choosing proper antennas to minimize the reflected signal. It is very difficult to totally reduce these effects from GPS[9] observations but we can apply some technique to reduce multipath effect. This paper shows that a ring choke [2] antenna can play a vital role in reducing the fading effect. The Global Positioning system is a space-based radio positioning and navigation system that provides 24 hour, all weather, and world-wide coverage with position, velocity and timing information. It is composed of a space segment, a control segment and a user segment. The space segment is a constellation of 25 satellites divided in different blocks; identification is composed of numbers, Pseudo Random Noise (PRN) code and orbital position number. The control segment consists of a system of tracking stations located around the world and a master control station. Then, the user segment is composed of equipment that receives and tracks the satellite signals.

II. ANALYSIS OF SNR WITH GPS RECEIVER

To observe the effect of Fading in terms of SNR[5] we have collected data from GPS trainer kit ST 2276 receiver having its own receiver antenna as patch Antenna the reading were taken in antenna lab of JIET College and nearby locations from January to July month of year 2014.

We observed that in the month of May The signal strength of satellites in terms of SNR are more because they are in line of sight as compared with the results taken in taken within antenna lab. This can be clearly detected and analyzed with the SNR results.

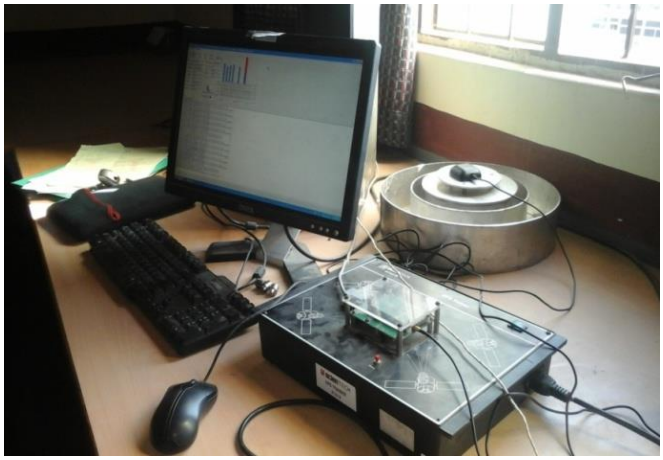

Fig. 1 Set up for SNR calculation

The reading of SNR with the help of Ring choke antenna is also calculated and shows significant improvement in the SNR as it is helpful in mitigating multipath [10] fading effect. A setup for GPS with ring Choke antenna shown at the time of taking reading shown in Fig. 1

III. RESULT

The Improvement in performance of SNR with ring choke antenna with GPS receiver has been shown in table 2, In table 1the reading shows the average value of SNR taken in months from January to September without Ring Choke and when we used ring choke antenna for reception in GPS there is significant improvement can be easily investigated as shown in Table 2.

Table 1: Cumulative SNR from January to September without ring base

Month	January	April	May	June	July	September
SNR	42	19	39	38	46	42

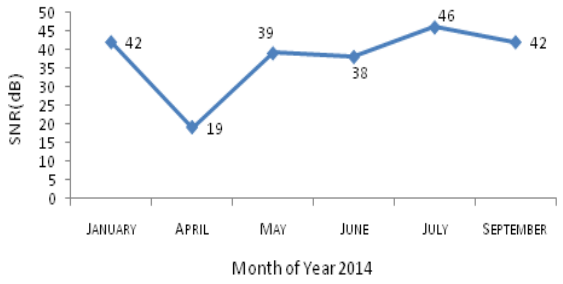

Fig 2: SNR without ring choke antenna

Table 2: SNR from October to November with and without ring base

Month	SNR with RING	SNR without RING
October	42	38
November	40	34
December	48	37

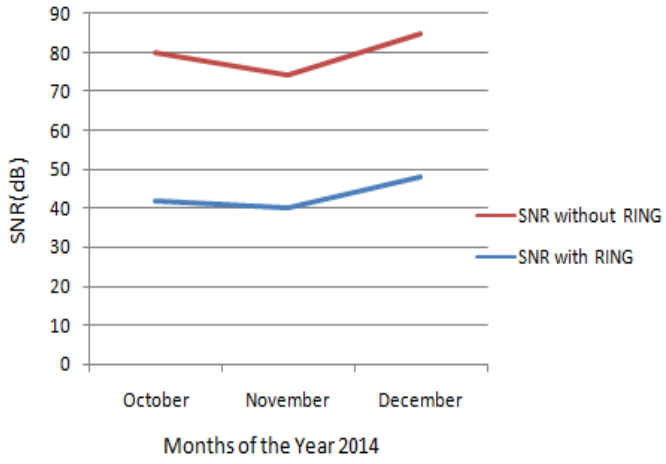

Fig. 3 SNR with and without ring Choke Antenna

IV. CONCLUSION

This paper shows that SNR improvement can be done using Ring choke Antenna implementing it with GPS receiver system, and this can be validated using results shown in fig. 3 which we have investigated throughout the month of January to December 2014. Since this paper shows only received signal SNR. In future it can be implemented in GPS system by miniaturizing Ring Choke antenna for compatible GPS System.

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