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Simulation Of Echo Canceller For Network Extender

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Abstract- In this paper we consider the weak signal leading to barely audible conversations and continuously dropped calls and loss of data connection in cell phones. This paper introduces a novel product called The Network extender which conquers this wireless dead zone. It strengthens weak cellular signals to deliver high quality signals for voice, data and video reception on cell phones. Here we are introducing adaptive echo cancelling digital processing which helps Performance of the Network extender. All idea is about bringing the base station nearer to Cell phone.

Keywords— **Network extender, EVM,BER.**

I. INTRODUCTION

This product is an intelligent integrated cell phone signal repeater box, alternately referred as Mobile Network Extender. It is a carrier agnostic broadband repeater with channelized performance. Physically it is a small solution to improved cell phone performance in the automobile (to be adapted to a home use product later).The performance of the Network Extender will be effected by the Echo signal. The received signal at the local receiver (NE) antenna will have actual signal to be received from the donor side and the part of the signal from local transmit antenna (NE) of the RF repeater (Which is also called as the Echo Signal). To handle this undesirable scenario The Echo cancellation algorithm will estimate the delay and channel variations in the Echo path and subtract from the received signal.

I. LITERATURE REVIEW

One current class of products in the market designed to improve poor cell reception involves what are called repeaters, also called cell phone boosters, which depend on at least a weak cell tower signal to amplify and rebroadcast. Many repeaters have multiple parts, starting with an antenna that you place as close as possible to the strongest cell tower signal, which is typically found near a window or even outdoors or on the roof. The antenna transmits signals over a cable connected to an amplifier, which boosts the signal and retransmits in indoors. However, this lacks portability as one has to deal with an external antenna and an extension of coaxial cable. Network Extender is the size of a paper book, doesn't have the messy cable and antenna of repeaters, doesn't require handoff to the Internet and is fully portable. The product has a compact, fully integrated antenna which is used for both outgoing and incoming signals. The Network Extender operates for all radio frequencies and spectrums as shown below.

BAND	Uplink (UL) Band FUL_low – FUL_high	Downlink (DL) Band FDL_low – FDL_high
12	698 MHz – 716 MHz	728 MHz – 746 MHz
13	777 MHz – 787 MHz	746 MHz – 756 MHz
5	824 MHz – 849 MHz	869 MHz – 894MHz
4	1710 MHz – 1755 MHz	2110 MHz – 2155 MHz
2	1850 MHz – 1910 MHz	1930 MHz – 1990 MHz

III.ECHO CANCELLATION

The Main functional blocks involved in the echo canceller algorithm are

- Correlation
- Delay estimation
- Channel estimation
- Equalization

Correlation

This module will do the correlation between received signal and reference signal. Here we use Zadoff-Chu sequence as reference signal, the correlation method will be used to estimate the delay in the echo path.

Delay estimation

This module will estimate the delay in the echo path and the phase shift of RF components. The maximum peak in the correlation result will be used to estimate delay. The delay estimation will be done by correlation method. Find out the maximum peak in the correlation data and estimate the delay.

Channel estimation

The channel in the echo path will be estimated from the received samples and the buffered signal. The channel estimates will be updated during the calibration. The channel estimates will be stored in the buffer and the average channel estimates will be used for equalization.

Equalization

The equalization of the received data will be done by zero forcing equalization method. The averaged channel estimates and buffered signal will be used for the equalization. The estimated delay will be applied on the buffered signal and equalized with the average channel estimates. This delayed and equalized signal will be subtracted from the received signal to get the echo cancelled data.

IV .PERFORMANCE PARAMETERS

BER

[Bit Error Rate]: The bit error ratio is the number of bit errors divided by the total number of transferred bits during a studied time interval.BER is a unit less performance measure, often expressed as a percentage.

EVM

[Error Vector Magnitude]**:** sometimes also called (**receive constellation error** or **RCE**) is a measure used to quantify the performance of a digital radio transmitter or receiver. A signal sent by an ideal transmitter or received by a receiver would have all constellation points precisely at the ideal locations; however various imperfections in the implementation cause the actual constellation points to deviate from the ideal locations. Informally, EVM is a measure of how far the points are from the ideal locations in Constellation diagram.

V. ANALYSIS OF SIMULATIONS AND RESULTS

Figure 1 shows the simulation result of received vectors with their respective positions in constellation diagram.
x-axis is In-phase amplitude.
y-axis is Quadrature-amplitude.
1) EVM we are getting as 9.54 %(10 to 15% is allowed), So that we can recover the signal at receiver with less error.
2) BER is found zero, ie The data trasmited is received properly.

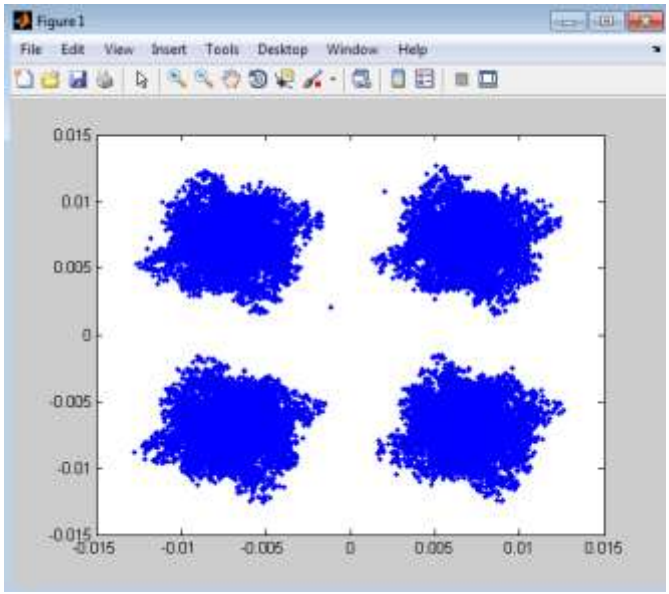

Figure 1

VI.CONCLUSION REMARKS

In This paper, we are simulated the Adaptive Echo canceller for the Network extender. Since user experience the low signals and frequent call drops in both home and moving scenarios .So Network Extender gives Better solutions for above problems and helps to conquer dead zones.

VII. References

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