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APPLIED GREEDY METHOD IN HYBRID INTERFERENCE CANCELLATION FOR DS-CDMA SYSTEMS

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ABSTRACT

The spreading sequence process of DS-CDMA systems, mostly affect by the multi access interference and it reduces by the hybrid multiuser interference cancellation technique. It has been applied to the greedy technique with use of rake receiver. The hybrid cancellation process is performed with two cancellation techniques one of parallel interference cancellation another one successive interference cancellation. In the multiuser environment bit error rate, power values are more important and its proposed cancellation techniques give better bit error rate value than previous cancellation techniques. After my Greedy hybrid interference cancellation the bit error value is 5.0634 for 10 users with 1600 bits and its better than the normal hybrid interference cancellation bit error rate value 5.3536.

Keywords: DS-CDMA, GHIC, HIC, SIC, PIC

I. INTRODUCTION

Transmitting multiuser data send through a wireless environment is more difficult than a wired environment. The DS-CDMA spread spectrum methodology is mostly utilized in multi user detection section than Frequency Division Multiple Access, Time Division Multiple Access. In CDMA system the multiple access interference provides the different power levels and various BER values of given users [1]. The DS-CDMA method is improved with multiuser detection classified into the optimal and sub optimal. In best detection performance is a smaller amount than the suboptimal detection. The DS-CDMA method is improved with multiuser detection classified into the optimal and subs optimal [6]. The sub optimal detection methods are successive interference cancellation-SIC, parallel interference cancellation-PIC and its combination called as hybrid interference cancellation-HIC [2]. The pseudo noise code sequence should be a periodic sequence with a noisy wave type in my process gold sequences is performed otherwise called as a double PN sequence [4]. The PN sequence is a binary sequence, typically constructed by a feedback register, that consists of a regular register created from a variety of flip flops and it's multiplied by the each user. In the generally RF signal process, transmit waves are arriving with small variance time delays, self-interference happens. The rake receiver design permits an optimal combining of energy received over ways with different power levels. In main consider DS-CDMA all users synchronize with every PN sequence code. In the multiuser cancellation technique of HIC are supported by the greedy method.

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II. MULTI USER DETECTION

The DS-CDMA performance is improved with the use of the multiuser detection process the multiuser information sequence and code sequence are correlated in transmitter section and both are must be reprocess perform in receiving side the detection schemes are a linear and subtractive cancellation [4]. The Matched filter decorrlating detector-DD, Minimum Mean Square Error-MMSE, conventional successive interference cancellation-CSIC, conventional parallel interference cancellation-CPIC detectors are previous multi user detection techniques. In decorrlating detector perform the one bit at a time and its need to reciprocal of the matrix R are difficult to perform in real time environment [4]. In the matched filter is performed in the detection side next step to rake receiver and its output is denoted by (1)

$$Y=RAb+n \quad (1)$$

Where R is the crosscorrlation matrix, A is the received signal amplitude values, b is the bit value, n is the noise value [6]. The decorrlating detector is a one of multi user detection techniques the user powers are not important in their process, but it has a timing value of code sequences [4]. The output equation of DD is denoted by (2)

$$b\hat{}=\text{sgn}((R^{-1}y)) \quad (2)$$

The MMSE linear detector had the two various processes one is that the wants no previous data of the SNR or the signature waveforms of every user, however, needs a training sequence to use and perform the optimum weights to be applied to the received data point. The second process doesn't need a training sequence, however, necessary to understand actual data of the signature sequence of every user [4] output equation is denoted by (3)

$$b\hat{}=\text{sgn}((y/(R+\sigma^2A^{-2})) \quad (3)$$

The other multiuser detection is the subtractive interference cancellation and it's classified into the conventional successive interference cancellation-SIC, parallel interference cancellation-PIC. In SIC detect signal with the conventional detector and select the strongest signal. Each stage of this detector decisions, regenerates, and cancels out one additional DS-CDMA users and it performs reduce in the next stage of multi access interference [6] output equation is denoted by (4)

$$b\hat{}_k=\text{sgn}(y_k-\sum_{k=0}^{k} A_k S_k) \quad (4)$$

In above equation k is the users level, S_k is the signature sequence. The parallel interference cancellation-PIC estimates and subtracts out all of the interference for every user in parallel stages and its created hard decision on robust signal. In the details process of the initial bit estimates of the derived from the matched filter. These bits are estimates represent by the codes it gives the delayed values of the received signal for each user. This process can be repeated multi stages and its output given by (5)

$$d\hat{}_k^{(m+1)}=\text{sgn}(y_k-\sum^{k} \quad A \quad S \quad) \quad (5)$$

$k=j+1 \; k \quad k$

In the equation m is the performing stages of PIC but SIC detector performs higher than the PIC detector during attenuation surroundings, but reverses in power controlled process [6].

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III. HYBRID INTERFERENCE CANCELLATION

The hybrid interference cancellation-HIC is the combination of the successive interference cancellation-SIC and parallel interference cancellation-PIC. In general the HIC has the better BER value is then previous detector techniques. The successive interference cancellation receiver is the simple, but requires high computational time, whereas the parallel interference cancellation receiver is more complex, but computational time is less. The total HIC estimates are the configuration of k-PC-SC process and its explain below flowchart diagram. K means the total users in the system PC is the users are cancelling in parallel and SC is the users are cancellation in series [3].

The proposed receiver has the PIC as the first stage of a cancellation, where a few number of users who have the decision statistic above a certain threshold, are cancelled in parallel. The remaining users are given to the second stage of cancellation SIC. The SIC cancels users, one at a time, until the desired user's signal are separated. The subtracted signal is given to a conventional receiver to get the users information [6]. The performance of the proposed HIC receiver only depends on the threshold or decision static.

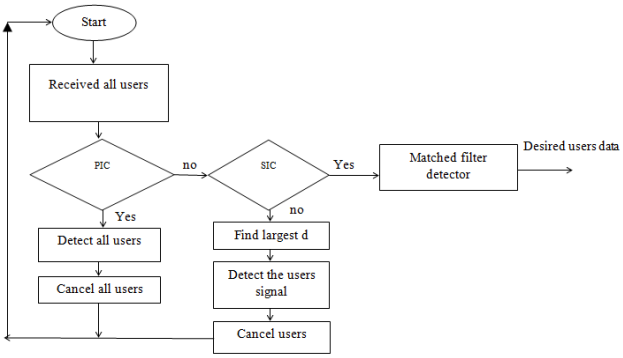

Fig.1 Flowchart of HIC

The total process end when the wanted user data will be shown in the cancellation process. Until the hybrid cancellation process won't be stopped. In my hybrid interference cancellation work obtained bit error rate value is shown in the table.1.

IV. GREEDY APPLIED IN HIC

The Greedy algorithm is designed to achieve optimum solution for a given problem. In greedy algorithm approach, decisions are made from the given solution domain. Greedy algorithms try to find a localized optimum solution, which may eventually lead to globally optimized solutions.

Greedy algorithms have some advantages and disadvantages

- It is quite easy to come up with a greedy algorithm for a problem.
- Analyzing the run time for greedy algorithms will generally be much easier than for other techniques.
- The difficult part is that one has to work much harder to understand correctness issues for greedy algorithms.

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In the greedy applied hybrid interference cancellation process is the rake receiver set up in the front end of detection side. The rake receiver output is applied to greedy process in the section, choose the reliable users and given to the hybrid interference cancellation process shown in fig.2. In the HIC process perform the output of the greedy with k-PC-SC configuration. The BER value of GHIC is shown in the table.1.

The PC cancellation equation is given by (6)

$$b\hat{}^{(m+1)}=\text{sgn}(\text{Re}(y_k-\sum_{k=j+1}^{k} A_k S_k) \quad (6)$$

And the SC cancellation equation is given by (7)

$$b\hat{}_k=\text{sgn}(\text{Re}(y_k-\sum_{\cdot}^{k} A_k S_k) \quad (7)$$

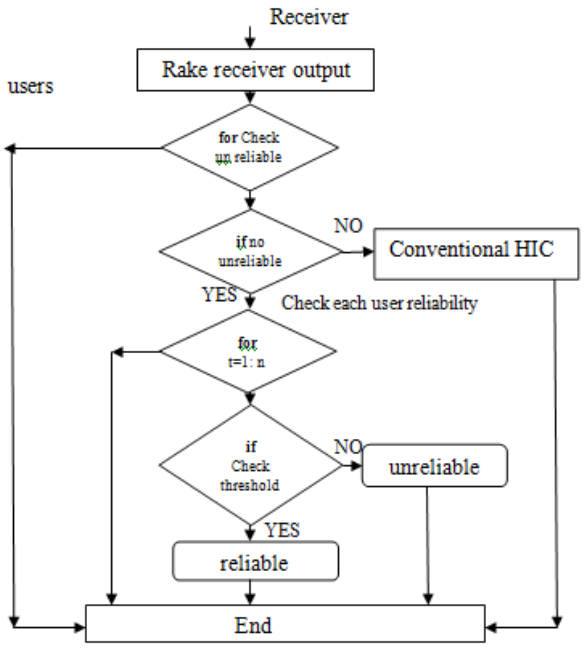

Fig.2 Flowchart of Greedy HIC

V.RESULTS AND DISCUSSIONS

The simulation outputs are obtained from the Matlab software for Matched filter, Successive interference cancellation, 3 stage Parallel interference cancellation, Hybrid interference cancellation, Greedy applied hybrid interference cancellation. In the simulation output for 10 users with 1600 bits for each user shown in Fig.3.And proposed, previous detector BER simulation diagram shown in Fig.4.In Fig.4 x-axis denoted Transmitted bits and y-axis denoted as amplitude level.

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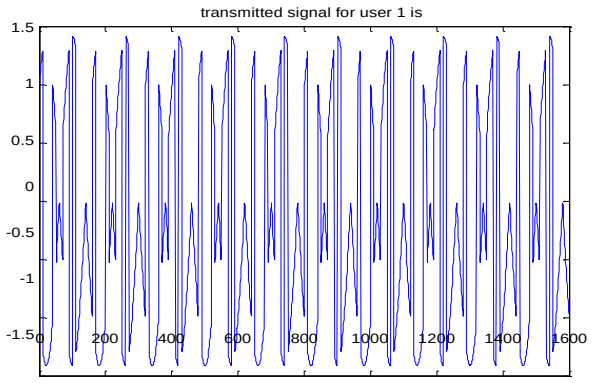
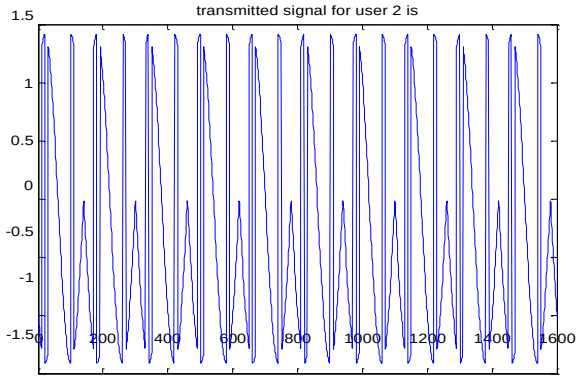
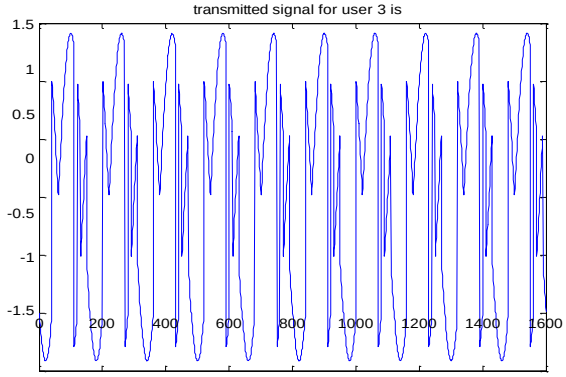
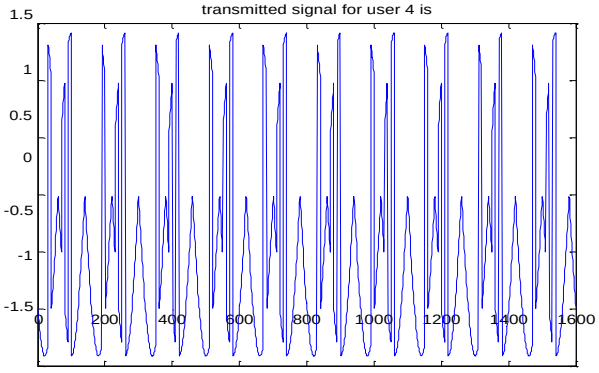
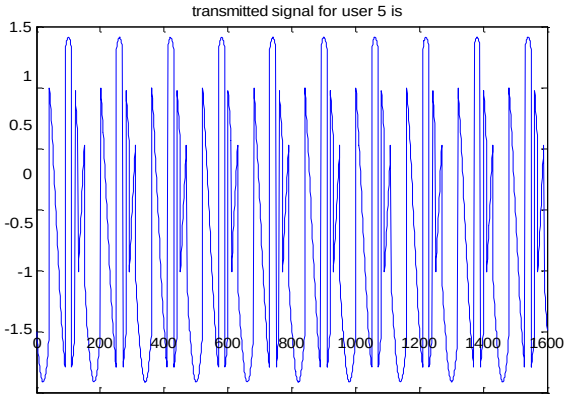
TRANSMITTED SIGNAL FOR 10 USERS

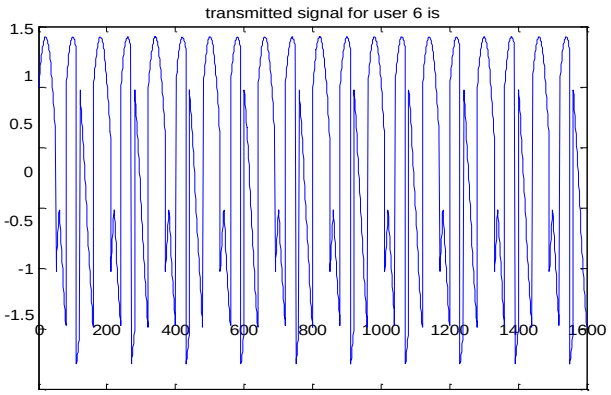












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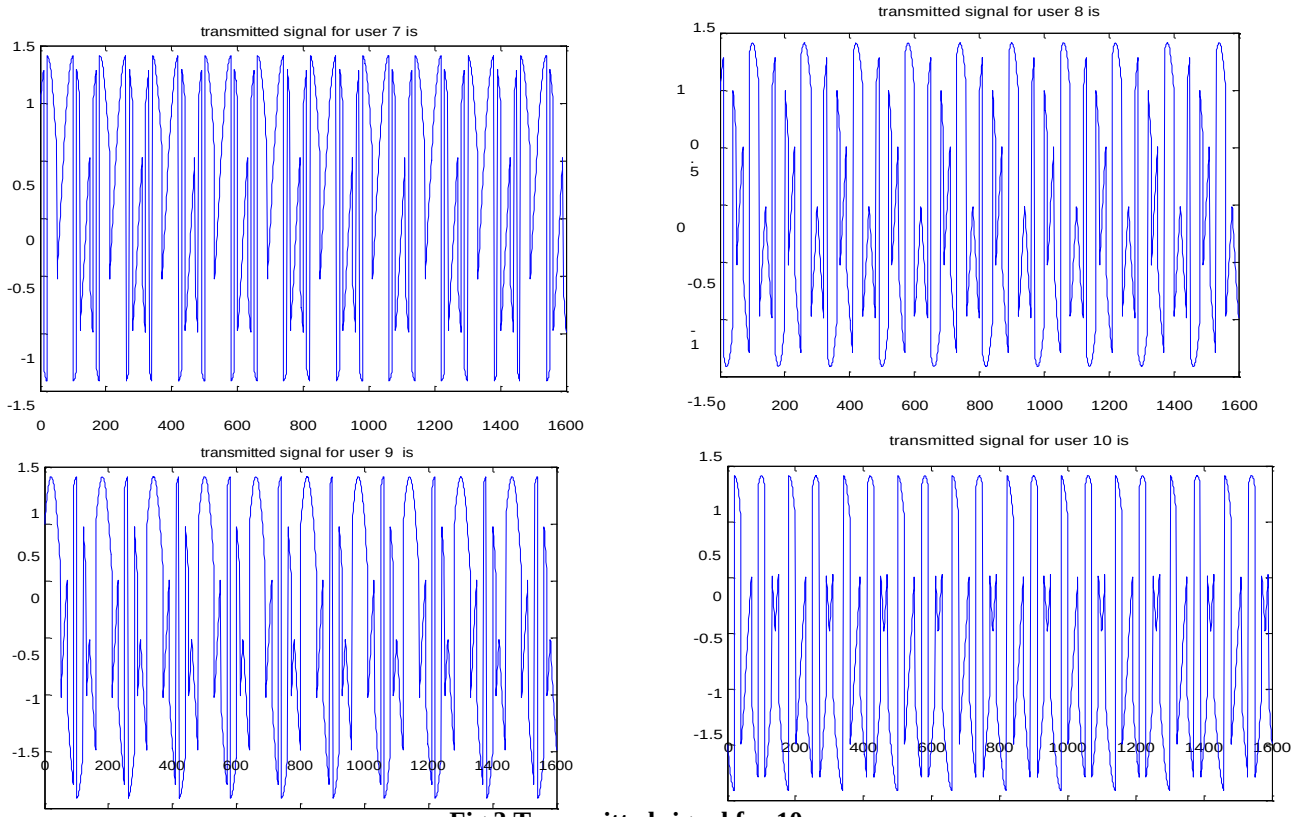

Fig.3 Transmitted signal for 10 users

Table. 1 BER value for proposed and existing detector

S.NO	MUD	BER
1.	GHIC	5.0634
2.	HIC	5.3536
3.	Stage-1 PIC	8.4341
4.	Stage-2 PIC	8.4302
5.	Stage-3 PIC	6.9870
6.	SIC	5.4409
7.	Matched Filter	9.5865

In the Table.1 shows that the various detector BER values the proposed method of Greedy HIC has BER of 5.0634 it is better than the remaining detector BER values. The remaining detectors are HIC, stage-1 PIC, stage- 2 PIC, stage-3 PIC, SIC, Matched filter and their BER values are 5.3536, 8.4341, 8.4301, 8.4302, 6.9870,
5.4409, and 9.5865.

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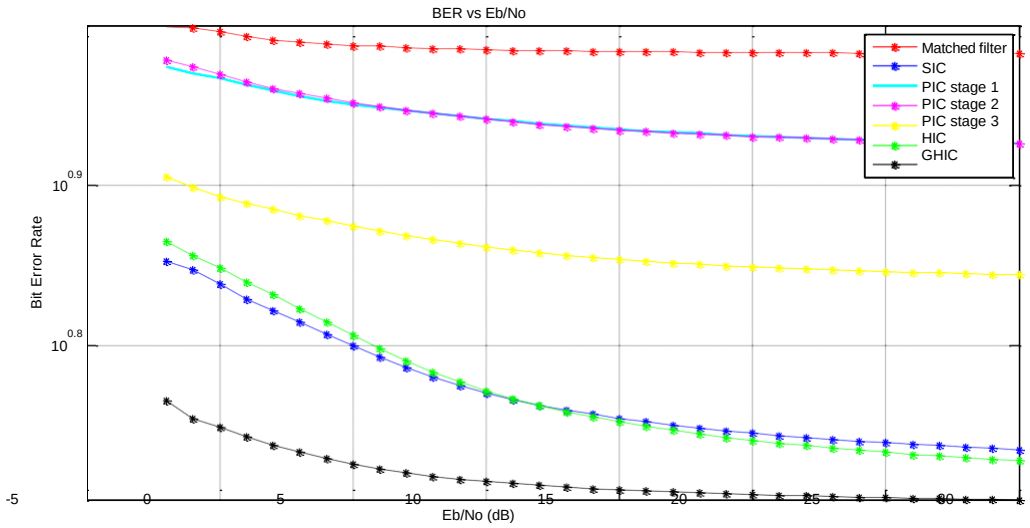

Fig.4 BER for various detectors

VI. CONCLUSION

In this process Greedy method applied in hybrid interference cancellation along using with RAKE receivers based on the greedy method in DS-CDMA spread spectrum technique has been done. The proposed detector BER value is better than the previous detector. In the future work will be implement in real time application of Software Defined Radio kit (WiCOMM-T) and obtain the constellation plots for each detector performance.

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