Available online at www.ijsrnsc.org

IJSRNSC

Volume-1, Issue-3, Aug- 2013

Review Paper

www.ijsrnsc.org

Int. J. Sci. Res. in Network Security and Communication

ISSN: 2321-3256

Study of Various Power Control Mechanism in WCDMA

Akhilesh Panchal[1*], R.B. Gaikwad[2]

Department of Electronics and Communication Engineering, Ujjain Engineering College Ujjain M.P. (INDIA)

Received: 22 Jun 2013 Revised: 06 Jul 2013 Accepted: 15 Aug 2013 Published: 30 Aug 2013

Abstract- In this paper an iterative technique for sequential mobile power in WCDMA networks are presented. The obtain algorithm are DPC (Distributed power control), adaptive step size power control, modified variable step size power control, novel adaptive step power control algorithm in WCDMA. All the algorithms based on the induction of the transmitted power. Power control Mechanism is an important issue for wide band code division multiple access (WCDMA) systems which help in achieving higher capacity and provides high link performance. Power control allow to minimize the transmitter power while keeping the system performance above the require value. Modified adaptive step size power control mechanism show the increase in convergence speed and stability by properly choosing the parameters. The novel adaptive step size power control based on the function of the difference between the target and estimated SIR of the MS to obtain more stability of the system. All the power control mechanisms evaluated the outage probability in percentage for these power algorithms power control steps depend on the instantaneous mobile command and command history.

Index Term :- power control, DPC (Distributed power control), ASPC, Novel ASPC, SIR, WCDMA, MVSPC (Modified variable step size power control).

1 Introduction:-

power control is an important aspect of WCDMA system in mobile networking power is the main resource that is shared by the multiple access schemes.In WCDMA system, the cell coverage and cell capacity are interdependent the adaptive step size power control algorithm (ASPC) uses the bits allocated to pc in WCDMA the transmission unit in the WCDMA interface is a 10 ms frame each frame is divided into 15 time slots. in each time slot the mobile estimates the received SIR and compare it to SIR target.power control in WCDMA systems is a critical issue because it helps to alleviate from 'near for' problem transmitter adjusts their power according to the power control bits sent on the feedback channel . speed of the convergence is an important factor for power control mechanism.

2 Power Control :-

Power control in WCMDA is a combination of open loop power control and close loop power control. The close loop power control are further classify as

(a) Inner close loop power control
(b) Out Close loop power control

The inner close loop power control adjusts the transmitter power in order to keep the received signal to interference ratio (SIR) equal to a given target. The outer close loop power control maintain the target (SIR) be based on the bit error rate (BER). Outer loop power control updates the frequency is 10-100 Hz.The inner close loop PC measures the received quality, define as the received signal to interference ration (SIR) and send command to the transmitter for transmitter power update.

3 System Model :-

Consider the uplink power control, assume no. of base station is 'B' and no of mobile station is 'M' no of user active is 'U'.

Hence signal to interference ratio (SIR) at the JthBs due to IthMs is given by

$$\left(\frac{S}{I}\right) = \frac{E_b R_i}{N_o W} = \frac{g_{Ji} P_i}{\sum_{K\neq 1} g_{JK} P_k + n_i} = Y;$$

Where E b is the bit energy, no is the interference power spectral density R stands for information rate of each mobiles. W is the chip rate of the system. If denotes the link gain from IthMs to JthBs.

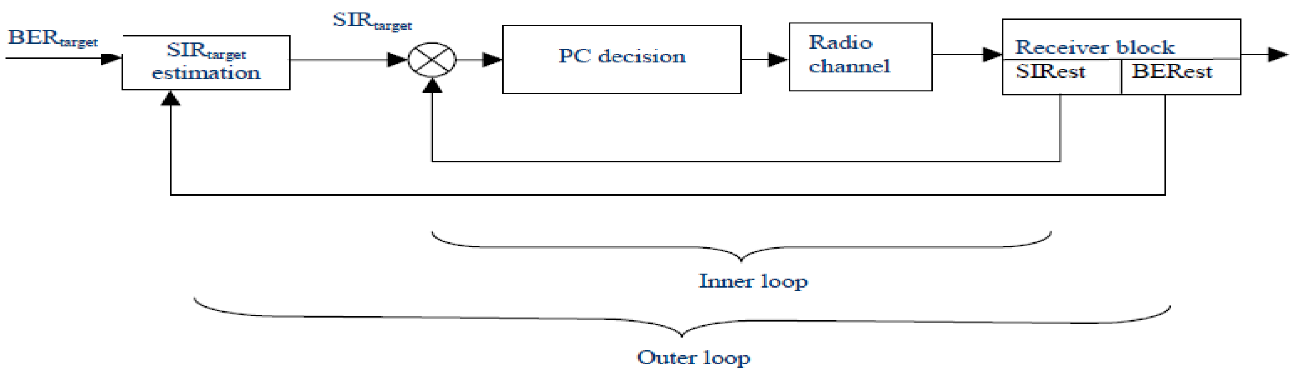

Figure 1 Showing that Power Control using SIR- Based Mechanism

3 Power Control Mechanism

3.1 Distributed power control mechanism : -The distributed power control mechanism based on relaxation method using Gauss-siddel iteration.
The Gauss-Seidel iteration for mobile power updates can be represented as :-

$$P: (K + 1) = \frac{Y^{tar}}{Y(K_1K+1)} P(K)$$

Where P : (k) is the transmitted power for user;
$Y^{(K1K+1)}$ is the signal to interference ratio (SIR)
Y^{Tar} = signal to interference ratio at Target.

3.2 **Adaptive step size power control mechanism**

Received quality based power control performs received power level based power control. The transmitter power range more than 70 dB in the adaptive step size power control the step size is 1 dB considered.
Adaptive step size power control follow as : -

(a) The update step is multiplied by μ when n_1 successive up commands are received.
(b) The update step is multiplied by V when no successive down commands are received.
(c) This value is divided by λ when alternate sequence are occur.

3.2 Modified variable step size power control mechanism : -

This mechanism is a modification form of variable step size closed loop power control in the modified variable step size power control we use 2 bit as a received power control bits.
Modified variable step size power control follow as :-

(a) If the target SIR is greater power up command is generated to increase the transmitter power
New transmitter power
$P_i(\underline{+}) = P(t-1) + \exp(S * \propto)$
S is the step size, ∝ is
(b) If the target SIR and estimated SIR are very close less than 1 dB then
$P(t) = P(t-1) + \exp(-\delta * x)$
Negative step size is employed to increase or decrease power in small steps .

3.3 Novel Adaptive step size power control mechanism :-

The instability comes from the hopping up or down of the power level of Ms's at large amount because of the multiple of update step occurring the SIR$_{est}$ being above or below of the SIR$_{Target}$ at alternate iterations we use novel adaptive step size power control mechanism.
Novel Adaptive Step size PC work as follow:-
(a)The difference between the SIR$_{Target}$ and SIR$_{est}$ as Δdiff would be in dB.
(b)The update step would be ∝ times Δdiff when no successive up command are received.
(c)The update step would be B times Δdiff when n_1 successive down commands are received.
(d)This value is divided by λ when the power update command sequence is an alternate sequence at up and down.

4 Conclusion

In this paper, we study the various power control mechanism for wide band code division multiple access (WCDMA) system. By the adaptive step size power control reduce the outage probability but instability are present by the modified adaptive step size power control mechanism given the complete reduction of the oscillation then make the stable system. Novel adaptive step size power control are based on the difference of the SIR$_{est}$ and SIR$_{Target}$ over all Modified adaptive step size power control are better because it completely reduce oscillations.

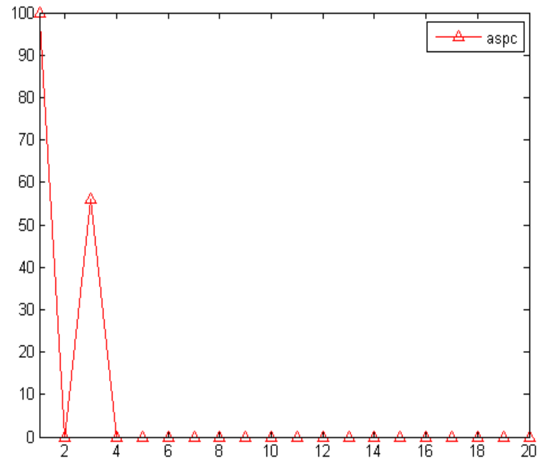

Figure 2 showing that Outage Probability Versus no. of Iteration for ASPC Algorithm

REFRENCES

[1] H. Holma, A. Toksala, WCDMA for UMTS , revised edition. Wiley, 2001.

[2] M.P.J. Baker , T.J. Moulsley, “power control in UMTS release ’99,” in proc. of First International Conference on 3G Mobile Communication Technologies ,Mar 2000.

[3] Virtej I., Rintamaki M., and Koivo H., “Enhanced fast power control for WCDMA systems”, inproc. Of the 11th IEEE International Symposium on personal , Indoor and Mobile Radio Communication, 2000,pp.1435-1439.

[4] Singh, Umesh Kumar, et al. "An Overview and Study of Security Issues & Challenges in Mobile Ad-hoc Networks (MANET)." International Journal of Computer Science and Information Security 9.4 (2011): 106.

[5] Nasreddine J., Nuaymi L., Lagrange X., “Adapative power control algorithm for 3G cellular CDMA networks”, in porc.of the 59rd IEEE Semi annular vehicular technology conference (VTC 04), 2004.

[6] Gudmundson M., “Corelation model for shadow fading in mobil radio systems”, Electronics letters, vol.27, pp.2145-2146, 1991.

[7] Mewada, Shivlal, and Umesh Kumar. "Measurement Based Performance of Reactive and Proactive Routing Protocols in WMN." International journal of advanced research in computer science and software engineering 1 (2011).

[8] L.lu,S. Zhu and S. Dong,”Fast Convergence Distributed power control algorithm for WCDMA Systems ”, IEE proc-commun. Vol.150,NO.2. April 2003.