Thesis Title	Bit Error Rate of Coherent Direct Sequence Code Division Multiple Access System in the Generalized Nakagami Fading Channel with Arbitrary Parameters Using Erasure-and-Error Correcting Code
Thesis Credits	12
Candidate	Mr. Chirawat Kotchasarn
Supervisors	Assoc. Prof. Dr.Kosin Chamnongthai
	Mr. Suwat Pattaramalai
Degree of Study	Master of Engineering
Department	Electrical Engineering
Academic Year	1998

Abstract

This thesis concerns the analysis of the bit error rate (BER) performance of the direct sequence code division multiple access (DS-CDMA) system with the binary data sequence using the phase shift keying modulation in the Nakagami multipath fading channel, where the fading parameters in each path are of independent but non-identical value. At the receiver we used the RAKE receiver model and the Reed Solomon (RS) error correcting code with error only decoding and the erasure-and-error decoding is presented in this thesis. After the post decoding, we obtained the lower bounds bit error rate performance and then compared the BER performance of the uncoded system, the system with the error only decoding and the erasure-and-error decoding. The numerical analysis obtained shows that the fading parameter effect on the system performance may be due to the non-identical value that makes the system performance very slightly worse than the identical value. A higher difference value in the fading parameter in each path makes the system performance worse than a slight difference, and the mean value of the fading parameter higher gives a lower probability of error. The system with Reed Solomon error correcting code made the BER performance better than the uncoded system and the erasure-and-error decoding gave a better performance than the error only decoding. The numerical analysis shows that if the error correcting code with the lower code rate is used the system performance is better. For example, the RS (15,8) code where the code rate was equal to 0.53 gave a lower BER performance than the RS (7,5) where the code rate was 0.71. For

the erasure-and-error decoding, the code symbol was unreliable (erased) if the channel amplitude was below a certain threshold amplitude equal to 0.3 of the maximum value which was the appropriate value in this thesis. Finally, the last parameter is the number of the RAKE receiver branches. By increasing the number of the RAKE receiver branches, the system performance was better and the numerical analysis shows that the suitable values were 4 receiver branches.

Keywords : Direct Sequence Code Division Multiple Access / Multipath Fading / Nakagami Fading / RAKE Receiver/ Reed Solomon Code/ Erasure-and-Error Decoding