TDD/CDMA 無線電系統下鏈容量分析

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摘 要

本文係探討一簡單型TDD/CDMA下鏈系統的基地台及行動台的干擾時間比例與系統容量，並加入護衛時間以避免行動台發生必須同時發射及接收的情況，其中一TDMA時框只包含發射及接收各一時槽。由於行動台為平均分佈於細胞內，在下行鏈路中，行動台距基地台越遠，其接收到的訊號-干擾比(SIR)越低。我們取兩點位於細胞邊緣，所受到的干擾較為嚴重處來分析其受干擾情形，再以通訊中斷率為標準，分析其系統容量。無線通道只考慮了路徑損失和遮蔽效應，而多路徑影響則假設可由其它訊號處理方法加以補償。 關於干擾方面，我們發現細胞半徑限制在小於3750公尺時，同細胞其它用戶不會對目標行動台造成干擾，而細胞外的干擾則只有鄰近基地台造成的干擾，由於細胞半徑限制在小於3750公尺，使得鄰近基地台的干擾時間比例相當的小。在細胞半徑為500、1000、3000公尺時，系統分別可容納29、29、29個使用者。我們可以觀察到當細胞半徑小於3750公尺時，通訊中斷率不會受到細胞半徑的影響。

關鍵詞 : TDD/CDMA、干擾時間比例、通訊中斷率、容量、細胞半徑

目錄

參考文獻

[1] R. J. Sanchez, “ CDMA digital cellular overview and field trials results, ” Technologies for Wireless Applications Diqest, pp. 37-43, Feb. 1995.

[2] O. Momtahan, H. Hashemi, “ A comparative evaluation of DECT, PACS, and PHS standards for wireless local loop applications, ” Personal Communications, IEEE, Vol. 7, Issue 3, PP.35-41, June 2000.

[3] R. Esmailzadeh, M. Nakagawa, and A. Jones, “ TDD-CDMA for the 4-th generation of wireless communications, ” IEEE Wireless Communications, vol. 10, no. 4, pp. 8-15, Aug. 2003.

[4] A. Samukic, “ UMTS Universal mobile telecommunication system: Development of standards for third generation, ” IEEE Transaction on Vehicular Technology, vol. 47, no. 4, pp. 1976-1983, Nov. 1998.

[5] T. Ojanpera and R. Prasad, “ An overview of air interface multiple access for IMT -2000/UMTS, ” IEEE communication Magazine, vol. 36, no. 9, pp. 82-95, Sep. 1998.

[6] E. Dahlman, B. Gudmundson, M. Nilsson, and J. Skold, “ UMTS/IMT-2000 based on wideband CDMA, ” IEEE communication Magazine, vol. 36, no. 9, pp. 70-80, Sep. 1998.

[7] E. Dahlman, B. Belling, J. Knutsson, F. Ovesjo, M. Persson, and C. Roobol, “ WCDMA-The radio interface for future mobile multimedia communications, ” IEEE Transaction on Vehicular Technology, vol. 47, no. 4, pp. 1105-1118, Nov. 1998.

[8] K. Tachikawa,“A perspective on the evolution of mobile communication,”IEEE Communication Magazine, vol. 41, no. 10, pp. 66-73, Oct. 2003.
[9] Y. Kim, B. J. Jeong, J. Chung, C.-S. Hwang, J. S. Ryu, K.-H. Kim and Y. K. Kim,“Beyond 3G: Vision, requirements, and Enabling Technologies,”IEEE Communication Magazine, vol. 41, no. 3, pp. 120-124, Mar. 2003.
[10] Huaming Wu, Weidong Li, Youzheng Wang, and Jing Wang,“WCDMA-TDD for Multimedia Mobile Communication,”State Key Lab. on Microwave & Digital Communications. Department of Electronic Engineering, Tsinghua University.
[11] Xingyao Wu, Lie-Liang Yang and Hanzo, L.,“Uplink capacity investigations of TDD/CDMA,”IEEE 55th VTC, vol. 2, pp. 997-1001, 6-9 May 2002.
[12] Miao Qingyu, Wang Wenbo, Yang Dacheng and Wang Daqing,“An analysis of the interference in the TDD/CDMA system,”TENCON 2000. vol. 1, pp. 333-337, 24-27 Sep. 2000.
[13] D. Li,“The perspectives of Large Area Synchronous CDMA Technologies,”IEEE Communication Magazine, vol. 41, no. 3, pp. 114-118, Mar. 2003.
[14] Mugen Peng, Biao Huang and Wenbo Wang ,“TDD/CDMA capacity loss due to adjacent channel interference in the macro environment employing smart antenna techniques,”2004 Asia-Pacific Radio Science Conference, pp. 146-149, 24-27 Aug. 2004.
[15] Jiang Chang, Wenbo Wang and Dacheng Yang,“Investigation of a combined power control scheme for a time-division duplex CDMA system,”The 2000 IEEE Asia-Pacific Conference on Circuits and Systems, pp. 46-49, 4-6 Dec. 2000.
[16] 李金椿, 崔德高, 曾平一, 徐永昇,“TDD/CDMA之上鏈數據流量分析,”Fourth Conference on Communication Applications, CCA Procceding, pp. 208-214, 北台技術學院, March, 2006.
[17] 陳俊男,“Performance analysis for multi-rate transmission in W-CDMA,”Ch2&3,大葉大學, 2002.
[18] J. L. Dornstetter and D. Verhulst,“Cellular efficiency with slow frequency hopping: Analysis of the digital SFH900 mobile system,”IEEE J. Sel. Area Commun., vol. 5, no. 5, pp. 835-848, Jun. 1987.
[19] R. Steele [Ed],“Mobile Radio Communication,”Pentech Press, 2002.
[20] P. Jung, P. W. Basier and A. Steil,“Advantages of CDMA and spread spectrum techniques over FDMA and TDMA in cellular mobile radio applications,”IEEE Transactions on Vehicular Technology, vol. 4, pp. 357-364, 1993.
[21] L. A. Gerhardt,“Spread Spectrum Communication,”NATO AGARD Lecture Series, no. 58, Jul. 1973.
[22] D. J. Torrieri,“Performance of direct-sequence system with long pseudo noise sequence,”IEEE J. Sel. Area Commun., vol. 10, no. 4, pp. 770-781, May 1992.
[23] R. Steele, C. C. Lee and P. Gould,“GSM CdmaOne and 3G Systems,”John Wiley & Sons, 2001.
[24] W.C.Y Lee,“Overview of cellular CDMA,”IEEE Transactions, vol. 40, Issue 2, pp. 291-302, May 1991.
[25] C.-C. Lee, C.-H. Wang and C.-H. Yang,“Performance of the W-CDMA in multi-path fading channels,”2003 International Conference on Informatics, Cybernetics, and Systems, 14-16 Dec., Kaohsiung, Taiwan, 2003.