د/ عماد سعيد محمد حسن

LIST OF PUBLICATIONS

(2008-2012)

• **Name**	**Emad Saied Mohamed Hassan**
• **Date of Birth**	**Dec. 2nd, 1981**
• **Address**	**Sheben El Kom - Menofia – Egypt**
• **Telephone**	**(+2) 0482116738 - (+2) 0101351938**
• **E-mail**	**eng_eamdash@yahoo.com** **emad.hassan@el-eng.menofia.edu.eg**
• **Affiliation**	**Department of Electronics and electrical Communications, Faculty of Electronic Engineering, Menoufia University, Egypt.**

A. Journal Publications

[1] **E.S. Hassan**, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "Peak-to-average power ratio reduction in space–time block coded multi-input multi-output orthogonal frequency division multiplexing systems using a small overhead selective mapping scheme ", ***IET Commun.***, vol. 3, no. 10, pp. 1667-1674, **2009**.

[2] **E.S. Hassan**, Xu Zhu, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "Performance Evaluation of OFDM and Single-Carrier Systems Using Frequency Domain Equalization and Phase Modulation", ***Int. J. Commun. Syst***., vol. 24, pp.1–13, **2011**.

[3] **E.S. Hassan**, Xu Zhu, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "A Chaotic Interleaving Scheme for Continuous Phase Modulation Based Single-Carrier Frequency-Domain Equalization Systems", ***Wireless Personal Commu***., vol. 62, no. 1, pp.183-199, Jan., **2012**.

[4] **E.S. Hassan**, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "PAPR Reduction for OFDM Signals with Unequal Power Distribution Strategy and a Reduced-Complexity SLM Scheme", ***Journal of Central South University of Technology, Springer***, vol. 19, no. 7, pp. 1902-1908, July **2012**.

[5] **E.S. Hassan**, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "A Chaotic Interleaving Scheme for Continuous Phase Modulation Based OFDM Systems", ***International Journal of Electronics***, pp. 1-14, 2012.

[6] E. M. El-Bakary, **E. S. Hassan**, O. Zahran, S. A. El-Dolil, and F. E. Abd El-Samie "Efficient Image Transmission with Multi-Carrier CDMA", ***Wireless Personal Commu***., DOI 10.1007/s11277-012-0622-6**. 2012**.

[7] **E.S. Hassan**, "Energy Efficient Hybrid Opportunistic Cooperative Protocol for SC-FDMA Based Networks", ***IET Commun.***, doi: 10.1049/iet-com.2012.0051**,** pp. 1-11, **2013**.

[8] **E.S. Hassan**, "Performance Enhancement of Continuous-Phase Modulation Based OFDM Systems Using Chaotic Interleaving**",** ***WSEAS Transactions on Systems***, vol. 12, no. 1, pp. 1-10, **Jan. 2013**.

[9] **E.S. Hassan**, "Spectrum Sensing and Power Efficiency Trade-off in Cognitive Radio Networks over Fading Channels**"**, ***WSEAS Transactions on Systems***, vol. 12, no. 1, pp. 32-41, **Jan. 2013**.

[10] **E.S. Hassan**, Xu Zhu, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "Chaotic Interleaving Scheme for Continuous Phase Modulation Single and Multi-Carrier Modulation Techniques", ***accepted to appear in Franklin Institute Journal***, Elsevier, **2013**.

[11] Ali. I. Mustafa, **E. S. Hassan**, K. H. Awadalla, S. S. El-Sheikh, X. Zhu, and F. E. Abd El-Samie, "Modified Short Multipath Insensitive Code Loop Discriminator", ***accepted to appear in GPS Solutions Journal*****, 2013.**

[12] **E.S. Hassan**, "Spectrum Sensing and Power Efficiency Trade-off Optimisation in Cognitive Radio Networks over Fading Channels", ***accepted to appear in IET Commun***., **2013**.

B. Conference Publications

[1] **E.S. Hassan**, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "A Simple Selective Mapping Algorithm for the Peak to Average Power Ratio in Space Time Block Coded MIMO-OFDM Systems", *Proc. of High performance, Networking and Communication Systems (**HPCNCS-08**)*, Orlando, Fl, USA, July 7-10, **2008**.

[2] **E.S. Hassan**, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "A Modified Selective Mapping Technique for PAPR Reduction In Coded MIMO-OFDM Systems", *Accepted for Publication in **IEEE VTC2008**-Fall*, Calgary, Canada, 2008.

[3] "Enhanced Performance of OFDM and Single-Carrier Systems Using Frequency Domain Equalization and Phase Modulation", ***Proc. of NRSC-09***, Egypt, March 17-19, **2009**.

[4] **E.S. Hassan**, Xu Zhu, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "New Interleaving Scheme for Continuous Phase Modulation Based OFDM Systems Using Chaotic Maps", *Proc. of the IEEE International Conference on Wireless and Optical Communications Networks* (**WOCN-09**), Cairo, Egypt, 28–30 April, **2009**.

[5] **E.S. Hassan**, Xu Zhu, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "A Continuous Phase Modulation Single-Carrier Wireless System with Frequency Domain Equalization", *Proc. of the IEEE International Conference on Computer Engineering and systems* (**ICCES'09**), Cairo, Egypt, 14–16 Dec. **2009.**

[6] **E.S. Hassan**, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie "Peak to Average Power Ratio Distribution for OFDM Signals with Unequal Power Distribution Strategy", ***Proc. of NRSC-10***, Egypt, March 16-18, **2010**.

[7] A. Elbehery, S. A. S. Abdelwahab, M. Abd EL Naby , **E.S. Hassan**, S. Elaraby, F.E. Abd El-Samie, "Efficient Image Transmission Over the Single Carrier Frequency Division Multiple Access System Using Chaotic Interleaving", ***Proc. of NRSC***, Egypt, **2012.**

[8] Ali. I. Mustafa, **E. S. Hassan**, K. H. Awadalla, S. S. El-Sheikh, X. Zhu, and F. E. Abd El-Samie, "Modified Short Multipath Insensitive Code Loop Discriminator" ***Proc. of IEEE INFOS***, Egypt, **2012.**

Journal papers

البحث رقم (1)

Puplished In:

WSEAS TRANSACTIONS on SYSTEMS
E-ISSN: 2224-2678
Issue 1, Volume 12, January 2013

Title

Spectrum Sensing and Power Efficiency Trade-off in Cognitive Radio Networks over Fading Channels

EMAD S. HASSAN
Dept. of Electronics and Electrical Communications
Menoufia University
Faculty of Electronic Engineering,
Menouf, 32952 EGYPT
eng_emadash@yahoo.com, emad.hassan@el-eng.menofia.edu.eg

Abstract:

Multiple secondary users can cooperate to increase the reliability of spectrum sensing in cognitive radio networks. However, the total transmission power grows approximately linearly with the number of cooperative secondary users. This paper proposes a new approach to optimize the trade-off between sensing reliability and power efficiency in cooperative cognitive radio networks over fading channels. We assume K cooperative secondary users each collect N samples during the sensing time. The proposed approach is based on dividing the spectrum sensing into two phases. In the first phase, we use only n of N samples, ($n \le N$) to check the channels state, then k of K cooperative secondary users, ($k \le K$) which are in deeply faded channels are discarded. We call this n a check point of the sensing time. The spectrum sensing with relatively less-faded channels are continued during the second phase. Therefore, there is a check point at which the sensing time can be optimized in order to maximize the probability of detection and the power efficiency. Several experiments are carried out to test the performance of the proposed approach in terms of detection probability and power efficiency. The obtained results show that the proposed approach enhances the detection probability as well as it shortened the optimal sensing time. Moreover, it improves the overall power efficiency.

Key-Words:

cognitive radio, cooperative spectrum sensing, power efficiency.

References:

[1] Federal Communications Commission,"Spectrum policy task force report, FCC 02-155." Nov. 2002.

[2] J. Mitola and G. Q. Maguire, "Cognitive radio: Making software radios more personal," IEEE Pers. Commun., vol. 6, Aug. 1999, pp. 13–18.

[3] A. Sendonaris, E. Erkip, and B. Aazhang, "User cooperation diversity-Part I: System description," IEEE Trans. Commun., vol. 51, Nov. 2003, pp. 1927–1938.

[4] A. Sendonaris, E. Erkip, and B. Aazhang, "User cooperation diversity-Part II: Implementation aspects and performance analysis," IEEE Trans. Commun., vol. 51, Nov. 2003, pp. 1939–1948.

[5] P. P. Hoseini and N. C. Beaulieu, "An optimal algorithm for wideband spectrum sensing in cognitive radio systems," in IEEE Int. Conf. on Commun., May 2010.

[6] E. Peh, Y. -C. Liang, Y. L. Guan, and Y. Zeng,"Optimization of cooperative sensing in cognitive radio networks: a sensing-throughput tradeoff view," IEEE Trans. Veh. Technol., vol. 58, no. 9, Nov. 2009, pp. 5294-5299.

[7] K. J. Ray Liu, A. K. Sadek, W. Su, and A. Kwasinski, Cooperative Communications and Networking, Cambridge University Press, 2009.

[8] S.S. Ikki and M.H. Ahmed "performance analysis of incremental-relaying cooperativediversity networks over Rayleigh fading channels" IET Commun., vol. 5, iss. 3, 2011, pp. 337–349.

[9] G. Ganesan and Y. Li, “Cooperative Spectrum Sensing in Cognitive Radio Networks,” in IEEE International Symposium on New Frontiers in Dynamic Spectrum Access Networks, Nov. 2005, pp. 137–143.
[10] J. Unnikrishnan and V. Veeravalli, “Cooperative Spectrum Sensing and Detection for Cognitive Radio,” in IEEE Global Telecommunications Conference, Nov. 2007, pp. 2972–2976.
[11] Y.-C. Liang, Y. Zeng, E. Peh, and A. T. Hoang,“Sensing-throughput tradeoff for cognitive radio networks,” in Proc. IEEE Int. Conf. on Commun., June 2007, pp. 5330-5335.
[12] Y. Zeng. Y.-C. Liang, E. Peh, and A. T. Hoang,“Sensing-throughput tradeoff for cognitive radionetworks,” IEEE Trans. Wireless Commun., vol. 7, no. 4, Apr. 2008, pp. 1326-1337.
[13] M. Cardenas-Juarez and M. Ghogho, “Spectrum sensing and throughput trade-off in cognitive radio under outage constraints over Nakagami fading” IEEE Commun. Letter, vol. 15, no. 10, Oct. 2011.
[14] F. F. Digham, M. Alouini, and M. K. Simon,“On the energy detection of unknown signals over fading channels” IEEE Trans. Commun., vol. 55, no. 1, Jan. 2007, pp.21-24.
[15] H. Urkowitz, “Energy detection of unknown deterministic signals,” in Proceedings of the IEEE, vol. 55, no. 4, April 1967, pp. 523-531.
[16] A. Ghasemi and E. S. Sousa, “Opportunistic spectrum access in fading channels through collobrative sensing,” J. Commun., vol. 2, no. 2, Mar. 2007, pp. 71–82.
[17] S. Maleki, S. Chepuri, and G. Leus, “Energy and throughput efficient strategies for
cooperative spectrum sensing in cognitive radios,” Proc. IEEE Int. Conf. on signal processing advances in wireless commun., 2011, pp. 71-75.

البحث رقم (2)

Puplished In:

A Chaotic Interleaving Scheme for The Continuous Phase Modulation Based Single-Carrier
(Wireless Pers Commun)

Title

A Chaotic Interleaving Scheme for the Continuous Phase Modulation Based Single-Carrier Frequency-Domain Equalization System

Emad S. Hassan · Xu Zhu · Said E. El-Khamy ·
Moawad I. Dessouky · Sami A. El-Dolil ·
Fathi E. Abd El-Samie
E. S. Hassan • M. I. Dessouky • S. A. El-Dolil • F. E. A. El-Samie (B)
Department of Electronics and Electrical Communications,
Faculty of Electronic Engineering,
Menoufia University, Menouf 32952, Egypt
e-mail: fathi_sayed@yahoo.com
E. S. Hassan
e-mail: eng_emadash@yahoo.com
M. I. Dessouky
e-mail: dr_moawad@yahoo.com
S. A. El-Dolil
e-mail: msel_dolil@yahoo.com
X. Zhu
Department of Electrical Engineering and Electronics, University of Liverpool, Liverpool L69 3GJ, UK
e-mail: xuzhu@liverpool.ac.uk
S. E. El-Khamy
Department of Electrical Engineering, Faculty of Engineering, Alexandria University, Alexandria 21544, Egypt
e-mail: elkhamy@ieee.org

Abstract:

In this paper, we propose a chaotic interleaving scheme for the continuous phase modulation based single-carrier frequency-domain equalization (CPM-SCFDE) system. Chaotic interleaving is used in this scheme to generate permuted versions from the sample sequences to be transmitted, with low correlation among their samples, and hence a better bit error rate (BER) performance can be obtained. The proposed CPM-SC-FDE system with chaotic interleaving combines the advantages of the frequency diversity, the low complexity, and the high power efficiency of the CPMSC- FDE system and the performance improvements due to chaotic interleaving. The BER performance of the CPM-SC-FDE system with and without chaotic interleaving is evaluated by computer simulations. Also, a comparison between the proposed chaotic interleaving and the conventional block interleaving is performed. Simulation results show that, the proposed chaotic interleaving scheme can greatly improve the performance of the CPM-SC-FDE system. Furthermore, the results show that this scheme outperforms the conventional block

Keywords :

SC-FDE · CPM · Chaotic interleaving · Frequency-domain equalization

References:

1. Falconer, D., Ariyavisitakul, S., Benyamin-Seeyar, A., & Eidson, B. (2002). Frequency domain equalization for single-carrier broadband wireless systems. IEEE Communications and Magagement, 40(4), 58–66.
2. Gusmo, A., Dinis, R., & Esteves, N. (2003). On frequency-domain equalization and diversity combining for broadband wireless communications. IEEE Communication Letters, 51(7), 1029–1033.
3. Pancaldi, F., Vitetta, G., Kalbasi, G. R., Al-Dhahir, N., Uysal, M., & Mheidat, H. (2008). Single-carrier frequency domain equalization. IEEE Signal Processing Magazine, 25(5), 37–56.
4. Sari, H., Karam, G., & Jeanclaude, I. (1995). Transmission techniques for digital terrestrial TV broadcasting. IEEE Communications Magazine, 33(2), 100–109.
5. Zhu, X., & Murch, R. (2004). Layered space-frequency equalization in a single-carrier MIMO system for frequency-selective channels. IEEE Transaction on Wireless Communicaions, 3, 701–708.
6. Nee, R. V., & Prasad, R. (2000). OFDM for wireless multimedia communications. Norwood: Artech House.
7. Schulze, H., & Luders, C. (2005). Theory and application of OFDM and CDMA wideband wireless communication. New York: John Wiley.

8. Anderson, J., Aulin, T., & Sundeberg, C. (1986). Digital phase modulation. New York: Plennum Press.
9. Kiviranta, M., Mammela, A., Cabric, D., Sobel, D. A., & Brodersen, R. W. (2005). Constant envelope multicarrier modulation: Performance evaluation in AWGN and fading channels. IEEE Milcom, 2, 807–813.
10. Thompson, S. C., & Ahmed, A. U. (2008). Constant-envelope OFDM. IEEE Transaction on Communications, 56(8), 1300–1312.
A Chaotic Interleaving Scheme for The Continuous Phase Modulation Based Single-Carrier
11. Buzid, T., & Huemer, M. (2009). Single carrier transmission with frequency domain equalization
(SC/FDE) system with a PAPR of unity. In Proceedings of ICACT-09 (Vol. 1, pp. 459–462). Feb. 2009
12. Tsai, Y., Zhang, G., & Pan, J.-L. (2005). "Orthogonal frequency division multiplexing with phase modulation and constant envelope design". In IEEE Milcom, 4, 2658–2664.
13. Thillo, W., Horlin, F., Nsenga, J., Ramon, V., Bourdoux, A., & Lauwereins, R. (2009). Low-complexity linear frequency domain equalization for continuous phase modulation. IEEE Transactions on Wireless Communications, 8(3), 1435–1441.
14. Pancaldi, F., & Vitetta, G. M. (2006). Equalization algorithms in the frequency domain for continuous phase modulations. IEEE Transactions on Communications, 54(4), 648–658.
15. Hassan, E. S., Zhu, X., El-Khamy, S. E., Dessouky, M. I., El-Dolil, S. A., & Abd El-Samie, F.E. (2009). A continuous phase modulation single-carrier wireless system with frequency domain equalization. In Proceedings of ICCES-09, Cairo, Egypt, 14–16 Dec. 2009.
16. Hassan, E. S., Zhu, X., El-Khamy, S. E., Dessouky, M. I., El-Dolil, S. A., & Abd El-Samie, F.E. (2010). Performance evaluation of OFDM and single-carrier systems using frequency domain equalization and phase modulation. International Journal of Communication Systems (in press).
17. Barbieri, A., Fertonani, D., & Colavolpe, G. (2009). Spectrally efficient continuous phase modulations. IEEE Transactions on Wireless Communications, 8(3), 1564–1572.
18. Castello, D.J., Hagenauer, J., Imai, H., & Wicker, S. (1998). Applications of error-control coding. IEEE Transactions on Information Theory, 44, 2531–2560.
19. Shi, Y. Q., Zhang, X. M., Ni, Z.-C., & Ansari, N. (2004). Interleaving for combating error bursts. IEEE Circuts and systems magazine, 4, 29–42 (First Quarter 2004).

20. Nguyen, V. D., & Kuchenbecker, H. (2001). Block interleaving for soft decision viterbi decoding in ofdm systems. In IEEE VTC (Vol. 1, pp. 470–474). 2001.
21. Jovic, B., & Unsworth, C. (2007). Chaos-based multi-user time division multiplexing communication system. IET Communications, 1(4), 1751–8628.
22. Matthews, R. (1998). On the derivation of a chaotic encryption algorithm. Cryptologia XIII, 1, 29–41.
23. Deffeyes, K. S. (1991). Encryption system and method. US Patent, no. 5001754, March 1991.
24. Fridrich, J. (1998). Symmetric ciphers based on two-dimensional chaotic maps. International Journal of Bifurcation and Chaos, 8, 1259–1284.
25. Han, F., Yu, X., & Han, S. (2006). Improved baker map for image encryption," in ISSCAA, 2006, pp. 1273–1276.
26. Hassan, E. S., El-Khamy, S. E., Dessouky, M. I., El-Dolil, S. A., & Abd El-Samie, F. E. (2009). New interleaving scheme for continuous phase modulation based OFDM systems using chaotic maps. In Proceedings of WOCN-09, Cairo, Egypt, 28–30 April 2009.
27. Proakis, J. G., & Manolakis, D. G. (1996). Digital signal processing: Principles, algorithms, and applications (3rd edn). NJ: Prentice Hall.
28. Proakis, J. G., & Salehi, M. (1994). Communication Systems Engineering. New Jersey: Prentice Hall.

Author Biographies:

Emad S. Hassan received the B.Sc. and M.Sc. degrees in Electrical Engineering from Menoufia University, Egypt in 2003 and 2006, respectively. He is currently an Assistant Lecturer in the Dept. of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University. In 2008, he joined the Communications Research Group at Liverpool University, Liverpool, UK, as a Visitor Research Student doing research on wireless communication. He is currently working towards the Ph.D. degree in Communications Engineering from the Menoufia University. His areas of interests are CDMA, OFDM, SC-FDE, MIMO and CPM based systems.

Xu Zhu received the B.Eng. degree (with first class honors) from the

Huazhong University of Science and Technology, Wuhan, China, in 1999, and the Ph.D. degree from the Hong Kong University of Science and Technology, Hong Kong, in 2003, both in Electrical and Electronic Engineering. Since May 2003, she has been with the Department of Electrical Engineering and Electronics, the University of Liverpool, Liverpool, U.K., where she is currently a lecturer. Dr. Zhu was the vice chair of the 2006 and 2008 ICA Research Network International Workshops, which were held in Liverpool, U.K. She has served as a session chair and a technical program committee member for various conferences, such as IEEE GLOBECOM 2009 and IEEE VTC Spring-2009. Her research interests include MIMO, OFDM, equalization, blind source separation, cooperative communications and crosslayer optimization, etc.

Said E. El-Khamy received the B.Sc. (Honors) and M.Sc. degrees from Alexandria University, Alexandria, Egypt, in 1965 and 1967 respectively, and the Ph.D. degree from the University of Massachusetts, Amherst, USA, in 1971. He joined the teaching staff of the Department of Electrical Engineering, Faculty of Engineering, Alexandria University, Alexandria, Egypt, since 1972 and was appointed as a Full-time Professor in 1982 and as the Chairman of the Electrical Engineering Department from September 2000 to September 2003. He is currently an Emeritus Professor. Prof. El-Khamy has published more than three hundreds scientific papers in national and international conferences and journals and took part in the organization of many local and international conferences. His Current research areas of interest include Spread-Spectrum Techniques, Mobile and Personal Communications, Wave Propagation in different media, Smart Antenna Arrays, Space-Time Coding, Modern Signal Processing Techniques and their applications in Image Processing, Communication Systems, Antenna design and Wave Propagation problems. Prof. El-Khamy is a Fellow member of the IEEE since 1999. He received many prestigious national and international prizes and awards including the State Appreciation Award (Al-Takderia) of Engineering Sciences for 2004, the most cited paper award from Digital Signal Processing journal for

2008, the IEEE R.W.P. King best paper award of the Antennas and Propagation Society of IEEE, in 1980, the the A. Schuman's-Jordan's award for Engineering Research in 1982. He is also a Fellow of the Electromagnetics Academy and a member of Tau Beta Pi, Eta Kappa Nu and Sigma Xi.

Moawad I. Dessouky received the B.Sc. (Honors) and M.Sc. degrees from the Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1976 and 1981, respectively, and the Ph.D. from McMaster University, Canada, in 1986. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1986. He has published more than 140 scientific papers in national and international conference proceedings and journals. He is currently the head of the Dept. Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University. He has received the most cited paper award from Digital Signal Processing journal for 2008. His current research areas of interest include spectral estimation techniques, image enhancement, image restoration, super resolution reconstruction of images, satellite communications, and spread spectrum techniques

Sami A. El-Dolil received his B.Sc. and M.Sc. degrees in Electronic Engineering from Menoufia University, Menouf, Egypt, in 1977 and 1981, respectively. In 1986 he joined the Communications Research Group at Southampton University, Southampton, England, as a Research Student doing research on teletraffic analysis for mobile radio communication. He received his Ph.D. degree from Menoufia University, Menouf, Egypt, in 1989. He was a Post Doctor Research Fellow at the Department of Electronics and Computer Science, University of Southampton, 1991–1993. He is working as a Professor at the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt. His

current research interests are in high-capacity digital mobile systems and multimedia networks.

Fathi E. Abd El-Samie received the B.Sc. (Honors), M.Sc., and Ph.D. from the Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1998, 2001, and 2005, respectively. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 2005. He is a co-author of about 100 papers in national and international conference proceedings and journals. He has received the most cited paper award from Digital Signal Processing journal for 2008. His current research areas of interest include image enhancement, image restoration, image interpolation, super resolution reconstruction of images, data hiding, multimedia communications, medical image processing, optical signal processing, and digital communications

---

البحث رقم (3)

Puplished In:

IET Communications
Received on 27th January 2012
Revised on 26th July 2012
doi: 10.1049/iet-com.2012.0051

Title

Energy-efficient hybrid opportunistic cooperative protocol for single-carrier frequency division multiple access-based networks

E.S. Hassan
Faculty of Electronic Engineering, Department of Electronics and Electrical Communications, Menoufia University,
Menouf 32952, Egypt
E-mail: eng_emadash@yahoo.com; emad.hassan@el-eng.menofia.edu.eg

Abstract:

In this study, a new energy-efficient hybrid opportunistic cooperative (HOC) transmission protocol is proposed for single-carrier frequency division multiple access (SC-FDMA)-based cooperative networks. The author considers a single source–destination pair and multiple relays network. The proposed protocol improves the energy efficiency of SC-FDMAbased networks by selecting the most energy-efficient cooperative transmission protocol from a set of available protocols according to the current channel state information. The protocols considered in the development of the HOC protocol are amplify-and-forward, decode-and-forward, compress-and-forward and estimate-and-forward. Computer simulation is done over four different scenarios of channel conditions. The obtained results show that the proposed HOC protocol significantly improves the delay-limited capacity and minimises the outage probability of SC-FDMA-based cooperative networks. The results also show that the minimum required average total power in the proposed HOC protocol is less than that of opportunistic decode-and-forward by 0.55 dB.

References:

1 Jankiraman, M.: ‘Space–time codes and MIMO systems’ (Artech House, 2004)
2 Alamouti, S.M.: ‘A simple transmit diversity technique for wireless communications’, IEEE J. Sel. Areas Commun., 1998, 16, (8), pp. 1451–1458
3 Ray Liu, K.J., Sadek, A.K., Su, W., Kwasinski, A.: ‘Cooperative communications and networking’ (Cambridge University Press, 2009)
4 Sendonaris, A., Erkip, E., Aazhang, B.: ‘User cooperation diversity-Part I: system description’, IEEE Trans. Commun., 2003, 51, (11), pp. 1927–1938
5 Sendonaris, A., Erkip, E., Aazhang, B.: ‘User cooperation diversity-Part II: Implementations aspects and performance analysis’, IEEE Trans. Commun., 2003, 51, (11), pp. 1939–1948
6 Laneman, J., Tse, D., Wornell, G.W.: ‘Cooperative diversity in wireless networks: efficient protocols and outage behavior’, IEEE Trans. Inf. Theory, 2004, 50, (12), pp. 3062–3080
7 Ikki, S.S., Ahmed, M.H.: ‘Performance analysis of incremental-relaying cooperative-diversity networks over Rayleigh fading channels’, IET Commun., 2011, 5, (3), pp. 337–349

8 Falconer, D., Ariyavisitakul, S.L., Benyamin-Seeyar, A., Eidson, B.:‘Frequency domain equalization for single-carrier broadband wireless systems’, IEEE Commun. Mag., 2002, 40, (4), pp. 58–66
9 Hassan, E.S., Zhu, X., El-Khamy, S.E., Dessouky, M.I., El-Dolil, S.A., Abd El-Samie, F.E.: ‘Performance evaluation of OFDM and singlecarriersystems using frequency domain equalization and phase modulation’, Int. J. Commun. Syst., 2011, 24, pp. 1–13
10 Myung, H.G., Lim, J., Goodman, D.J.: ‘Single carrier FDMA for uplink wireless transmission’, IEEE Veh. Technol. Mag., 2006, 1, (3), pp. 30–38
11 Ekstrom, H., Furuskar, A., Karlsson, J., et al.: ‘Technical solutions for the 3 G long-term evolution’, IEEE Commun. Mag., 2006, 44, (3), pp. 38–45
12 Zhang, J., Yang, L.-L., Hanzo, L.: ‘Multiuser performance of the amplify-and-forward single-relay-assisted SC-FDMA uplink’. Proc. IEEE VTC Fall, September 2009, pp. 1–5
13 Zhang, J., Yang, L., Hanzo, L.: ‘Energy-efficient channel-dependent cooperative relaying for the multiuser SC-FDMA uplink’, IEEE Trans. Veh. Technol., 2011, 60, (3), pp. 992–1004
14 Li, D., Lei, P., Zhu, X.: ‘Novel space-time coding and mapping scheme in single-carrier FDMA systems’. Proc. IEEE PIMRC, Greece, September 2007, pp. 1–4
15 Gunduz, D., Erkip, E.: ‘Opportunistic cooperation by dynamic resource allocation’, IEEE Trans. Wirel. Commun., 2007, 6, (4), pp. 1446–1454
16 Yi, Z., Ju, M., Kim, I.: ‘Outage probability and optimum combining for time division broadcast protocol’, IEEE Trans. Wirel. Commun., 2011, 10, (5), pp. 1362–1367
17 Hanly, S.V., Tse, D.N.C.: ‘Multiaccess fading channels: part II: delay-limited capacities’, IEEE Trans. Inf. Theory, 1998, 44, (7), pp. 2816–2831
18 Jiang, H., Zhang, S., Zhou, W.: ‘Outage analysis of distributed scheme on opportunistic relaying with limited CSI’, IEEE Commun. Lett., 2011, 15, (9), pp. 935–937
19 Majhi, S., Qian, H., Xiang, W., Addepalli, S., Gao, Z.: ‘Analysis of outage probability for opportunistic decode-and-forward relaying network over asymmetric fading channels’. Proc. IEEE ICUFN, 2011, pp. 135–139
20 Lee, D., Jung, Y.S., Lee, J.H.: ‘Amplify-and-forward cooperative transmission with multiple relays using phase feedback’. Proc. IEEE Veh. Tech. Conf. (VTC), Montreal, Canada, September 2006
21 Zhao, Y., Adve, R., Lim, T.J.: ‘Improving amplify-and-forward relay networks: optimal power allocation versus selection’, IEEE Trans. Wirel. Commun., 2007, 6, (8), pp. 3114–3123

22 Yang, J., Brown, D.R.: ‘The effect of receiver diversity combining on optimum energy allocation and energy efficiency of cooperative wireless transmission systems’. Proc. IEEE ICASSP, 2007, pp. 493–496
23 Tabataba, F.S., Sadeghi, P., Pakravan, M.R.: ‘Outage probability and power allocation of amplify and forward relaying with channel estimation errors’, IEEE Trans. Wirel. Commun., 2011, 10, (1), pp. 124–134
24 Kramer, G., Gastpar, M., Gupta, P.: ‘Cooperative strategies and capacity theorems for relay networks’, IEEE Trans. Inf. Theory, 2005, 51, (9), pp. 3037–3063
25 Gunduz, D., Erkip, E.: ‘Opportunistic cooperation and power control strategies for delay-limited capacity’. Proc. Information Sciences and Systems, 16–18 March 2005
26 Wyner, A.D., Ziv, J.: ‘The rate-distortion function for source coding with side information at the receiver’, IEEE Trans. Inf. Theory, 1976, IT-22, (1), pp. 1–11
27 Cover, T., El Gamal, A.: ‘Capacity theorems for the relay channel’, IEEE Trans. Inf. Theory, 1979, IT-25, (5), pp. 572–584
28 Host-Madsen, A., Zhang, J.: ‘Capacity bounds and power allocation for wireless relay channel’, IEEE Trans. Inf. Theory, 2005, 51, (6), pp. 2020–2040
29 Yao, S.: ‘Relaying without decoding’. PhD thesis, Royal Institute of Technology (KTH), Stockholm, Sweden, 2011 available online via http://www.ee.kth.se
30 Dabora, R., Servetto, S.D.: ‘On the role of estimate-and-forward with time sharing in cooperative communication’, IEEE Trans. Inf. Theory,2008, 54, (10), pp. 4409–4431

البحث رقم (4)

Published in :

IET Communications
Received on 24th May 2008
Revised on 28th February 2009

doi: 10.1049/iet-com.2008.0565
IET Commun., 2009, Vol. 3, Iss. 10, pp. 1667–1674
doi: 10.1049/iet-com.2008.0565

Title

Peak-to-average power ratio reduction in space–time block coded multi-input multi-output orthogonal frequency division multiplexing systems using a small overhead selective mapping scheme

E.S. Hassan[1] S.E. El-Khamy[2] M.I. Dessouky[1]
S.A. El-Dolil[1] F.E. Abd El-Samie[1]
[1]Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University,
Menouf 32952, Egypt
[2]Department of Electrical Engineering, Faculty of Engineering, Alexandria University, Alexandria 21544, Egypt
E-mail: fathi_sayed@yahoo.com

Abstract:

The selective mapping (SLM) scheme is one of the most popular peak-to average power ratio (PAPR) reduction techniques proposed for multi-input multi-output orthogonal frequency division multiplexing (MIMO-OFDM) systems. One of the major disadvantages of this scheme is the need for the transmission of side information (SI) bits to enable the receiver to recover the transmitted data. The authors present a small overhead SLM (s-SLM) scheme for space–time block coded (STBC) MIMO-OFDM systems. This proposed scheme improves the system bandwidth efficiency and achieves a significantly lower bit error rate (BER) than the individual SLM (i-SLM) and direct SLM (d-SLM) schemes. In addition, approximate expressions for the complementary cumulative distribution function (CCDF) of the PAPR and the average BER of the proposed s-SLM scheme are derived. The simulation results show that the proposed s-SLM scheme improves the detection probability of the SI bits and hence gives a better performance than the i-SLM and the d-SLM schemes.

References

[1] NEE R.V., PRASAD R.: ‘OFDM for wireless multimedia communications’ (Artech House, 2000)
[2] SCHULZE H., LUDERS C.: ‘Theory and application of OFDM and CDMA wideband wireless communication’ (Wiley, 2005)
[3] HAN S.H., LEE J.H.: ‘A new PTS OFDM scheme with low complexity for PAPR reduction’, IEEE Trans. Broadcast., 2006, 52, pp. 77–82
[4] HAN S.H., LEE J.H.: ‘Modified selected mapping scheme for PAPR reduction of coded OFDM signal’, IEEE Trans. Broadcast., 2004, 50, pp. 335–341
[5] SLIMANE S.B.: ‘Reducing the peak-to-average power ratio of OFDM signals through precoding’, IEEE Trans. Veh. Technol., 2007, 56, pp. 686–695
[6] CHEN H., LIANG H.: ‘Combined selective mapping and binary cyclic codes for PAPR reduction in OFDM systems’, IEEE Trans. Wirel. Commun., 2007, 6, pp. 3524–3528
[7] BEAK M.S., KIM M.J., YOU Y.H., SONG H.K.: ‘Semi-blind estimation and PAR reduction for MIMO-OFDM system with multiple antennas’, IEEE Trans. Broadcast., 2004, 50,
pp. 414–424
[8] BAML R.W., FISHER R.F., HUBER J.B.: ‘Reducing the peak-toaverage power ratio of multicarrier modulation by selected mapping’, IEE Electron. Lett., 1996, 32, pp. 2056–2057
[9] JAYALATH A.D., TELLAMBURA C.: ‘SLM and PTS peak-power reduction of OFDM signals without side information’, IEEE Trans. Wirel. Commun., 2005, 4, pp. 2006–2013
[10] JANKIRAMAN M.: ‘Space–time codes and MIMO systems’ (Artech House, 2004)
[11] BREILING M., MULLER-WEINFURTNER S., HUBER J.: ‘SLM peakpower reduction without explicit side information’, IEEE Commun. Lett., 2001, 5, pp. 239–241
[12] KHOO B.K., GOFF S.Y., TSIMENIDIS C.C., SHARIF B.S.: ‘OFDM PAPR reduction using selected mapping without side information’. Proc. ICC 2007, June 2007, pp. 4341–4345
[13] ALAMOUTI S.M.: ‘A simple transmitter diversity scheme for wireless communications’, IEEE J. Select. Areas Commun., 1998, 16, pp. 1451–1458
[14] TAROKH V., JAFARKHANI H., CALDERBANK A.R.: ‘Space–time block coding for wireless communications: performance results’, IEEE J. Select. Areas Commun., 1999, 17, (3), pp. 451–460
[15] PRASAD R.: ‘OFDM for wireless communication systems’ (Artech House, 2004)
[16] NEE R.V., WILD A.D.: ‘Reducing the peak-to-average power ratio of OFDM’. Proc. IEEE Vehicular Technology Conf. (VTC’98), 1998, pp. 2072–2076

[17] WEI S., GOECKEL D.L., KELLY P.E.: ‘A modern extreme value theory scheme to calculating the distribution of the PAPR in OFDM systems’. Proc. IEEE ICC 2002, New York, NY, May 2002, pp. 1686–1690
[18] SHARIF M., GHARAVI-ALKHANSARI M., KHALAJ B.H.: ‘On the peakto-average power of OFDM signals based on oversampling’, IEEE Trans. Commun., 2003, 51, pp. 72–78
[19] WUNDER G., BOCHE H.: ‘Upper bounds on the statistical distribution of the crest-factor in OFDM transmission’, IEEE Trans. Inf. Theory, 2003, 49, pp. 488–494
[20] HAN S., LEE J.: ‘An overview of peak-to-average power ratio reduction schemes for multicarrier transmission’, IEEE Trans. Wirel. Commun., 2005, 12, pp. 56–65
[21] FISCHER R.F.H., HOCH M.: ‘Peak-to-average power ratio reduction in MIMO OFDM’. Proc. IEEE ICC, June 2007, pp. 762–767
[22] ALSUSA E., YANG L.: ‘Redundancy-free and BER-maintained selective mapping with partial phase-randomising sequences for peak-to-average power ratio reduction in
OFDM systems’, IET Commun., 2008, 2, pp. 66–74 1674

البحث رقم (5)

Puplished In:

INTERNATIONAL JOURNAL OF COMMUNICATION SYSTEMS
Int. J. Commun. Syst. (2010)
Published online in Wiley InterScience (www.interscience.wiley.com).
DOI: 10.1002/dac.1125

Title

Performance evaluation of OFDMand single-carrier systems using frequency domain equalization and phase modulation.

Emad S. Hassan[1], Xu Zhu[2], Said E. El-Khamy[3], Moawad I. Dessouky[1], Sami A. El-Dolil[1] and Fathi E. Abd El-Samie[1,□,†]
[1]Department of Electronics and Electrical Communications, Faculty of Electronic Engineering,
Menoufia University, 32952, Menouf, Egypt
[2]Department of Electrical Engineering and Electronics, The University of Liverpool, L69 3GJ, U.K.
[3]Department of Electrical Engineering, Faculty of Engineering, Alexandria University, Alexandria 21544, Egypt

SUMMARY

In this paper, we study the performance of the continuous phase modulation (CPM)-based orthogonal frequency division multiplexing (CPM-OFDM) system. Also, we propose a CPM-based single-carrier frequency domain equalization (CPM-SC-FDE) structure for broadband wireless communication systems. The proposed structure combines the advantages of the low complexity of SC-FDE, in addition to exploiting the channel frequency diversity and the power efficiency of CPM. Both the CPM-OFDM system and the proposed system are implemented with FDE to avoid the complexity of the equalization. Two types of frequency domain equalizers are considered and compared for performance evaluation of both systems; the zero forcing (ZF) equalizer and the minimum mean square error (MMSE) equalizer. Simulation experiments are performed for a variety of multipath fading channels. Simulation results show that the performance of the CPM-based systems with multipath fading is better than their performance with single path fading. The performance over a multipath channel is at least 5 and 12 dB better than the performance over a single path channel, for the CPM-OFDM system and the proposed CPM-SC-FDE system, respectively. The results also show that, when CPM is utilized in SC-FDE systems, they can outperform CPM-OFDM systems by about 5 dB. Copyright _

2010 John Wiley & Sons, Ltd. Received 18 March 2009; Revised 6 October 2009; Accepted 15 January 2010

KEY WORDS:

SC-FDE; OFDM; CPM; ZF equalizer; MMSE equalizer; constant phase; power reduction; equalization

REFERENCES:

1. Nee RV, Prasad R. OFDM for Wireless Multimedia Communications. Artech House: Boston, London, 2000.
2. Schulze H, Luders C. Theory and Application of OFDM and CDMA Wideband Wireless Communication. Wiley: New York, 2005.
3. Banelli P. Theoretical analysis and performance of OFDM signals in nonlinear fading channels. IEEE Transactions on Wireless Communications 2003; 2(2):284–293.
4. Dardari D, Tralli V, Vaccari A. A theoretical characterization of nonlinear distortion effects in OFDM systems. IEEE Transactions on Communications 2000; 48(10):1755–1764.
5. Banelli P, Baruffa G, Cacopardi S. Effects of HPA non linearity on frequency multiplexed OFDM signals. IEEE Transactions on Broadcasting 2001; 47(2):123–136.
6. Han S, Lee J. An overview of peak-to-average power ratio reduction techniques for multicarrier transmission. IEEE Transactions on Wireless Communications 2005; 12:56–65.
7. Lee Y, You Y, Jeon W, Paik J, Song H. Peak-to-average power ratio in MIMO-OFDM systems using selective mapping. IEEE Communications Letters 2003; 7:575–577.
8. Hassan ES, El-Khamy SE, Dessouky MI, El-Dolil SA, Abd El-Samie FE. Peak-to-average power ratio reduction in space–time block coded multi-input multi-output orthogonal frequency division multiplexing systems using a small overhead selective mapping scheme. IET Communications 2009; 3:1667–1674.
9. Chen H, Liang H. Combined selective mapping and binary cyclic codes for PAPR reduction in OFDM systems. IEEE Transactions on Wireless Communications 2007; 6:3524–3528.
10. Hassan ES, El-Khamy SE, Dessouky MI, El-Dolil SA, Abd El-Samie FE. A simple selective mapping algorithm for the peak to average power ratio in space time block coded MIMO-OFDM systems. Proceedings of HPCNCS-08, Orlando, FL, U.S.A., July 2008; 103–106.

11. Thompson SC, Ahmed AU, Proakis JG, Zeidler JR. Constant envelope OFDM phase modulation: spectral containment, signal space properties and performance. Proceedings of IEEE Milcom, vol. 2, Monterey, October 2004; 1129–1135.
12. Kiviranta M, Mammela A, Cabric D, Sobel DA, Brodersen RW. Constant envelope multicarrier modulation: performance evaluation in AWGN and fading channels. Proceedings of IEEE Milcom, vol. 2, October 2005; 807–813.
13. Tsai Y, Zhang G, Pan J-L. Orthogonal frequency division multiplexing with phase modulation and constant envelope design. Proceedings of IEEE Milcom, vol. 4, October 2005; 2658–2664.
14. Thompson SC, Ahmed AU. Constant-envelope OFDM. IEEE Transactions on Communications 2008; 56: 1300–1312.
15. Falconer D, Ariyavisitakul SL, Benyamin-Seeyar A, Eidson B. Frequency domain equalization for single-carrier broadband wireless systems. IEEE Communications Magazine 2002; 40(4):58–66.
16. Gusm˜ao A, Dinis R, Esteves N. On frequency-domain equalization and diversity combining for broadband wireless communications. IEEE Communications Letters 2003; 51(7):1029–1033.
17. Pancaldi F, Vitetta GM, Kalbasi R, Al-Dhahir N, Uysal M, Mheidat H. Single-carrier frequency domain equalization. IEEE Signal Processing Magazine 2008; 25(5):37–56.
18. Sari H, Karam G, Jeanclaude I. Transmission techniques for digital terrestrial TV broadcasting. IEEE Communications Magazine 1995; 33(2):100–109.
19. Proakis JG, Manolakis DG. Digital Signal Processing: Principles, Algorithms, and Applications (3rd edn). Prentice-Hall: NJ, 1996.
20. Proakis JG, Salehi M. Communication Systems Engineering. Prentice-Hall: NJ, 1994.
21. Liu Y, Du Y. A new coding scheme in SC-FDE. Proceedings of IEEE Wicom, Wuhan, China, 22–24 September 2006; 1–4.
22. Li J, Du Y, Liu Y. Comparison of spectral efficiency for OFDM and SC-FDE under IEEE 802.16 Scenario. Proceedings of IEEE ISCC'06, Cagliari, Sardinia, Italy, 26–29 June 2006; 467–471.
23. Wang Y, Dong X, Wittke P, Shaomin M. Cyclic prefixed single carrier transmission in ultra-wideband communications. IEEE Transactions on Wireless Communications 2006; 5:2017–2021.

AUTHORS' BIOGRAPHIES

Emad S. Hassan received the BSc and MSc degrees in Electrical Engineering from the Menoufia University, Egypt in 2003 and 2006, respectively. He is currently an Assistant Lecturer in the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University. In 2008, he joined the Communications Research Group at Liverpool University, Liverpool, U.K. as a Visitor Research Student doing research on wireless communication. He is currently working toward the PhD degree in Communications Engineering from the Menoufia University. His areas of interests are CDMA, OFDM, SC-FDE, MIMO, and CPM-based systems.

Xu Zhu received the BEng degree (with first class honors) from the Huazhong University of Science and Technology, Wuhan, China, in 1999 and the Ph.D. degree from the Hong Kong University of Science and Technology, Hong Kong, in 2003, both in Electrical and Electronic Engineering. Since May 2003, she has been with the Department of Electrical Engineering and Electronics, the University of Liverpool, Liverpool, U.K., where she is currently working as a lecturer. Dr Zhu was the vice chair of the 2006 and 2008 ICA Research Network International Workshops, which were held in Liverpool, U.K. She has served as a session chair and a technical program committee member for various conferences, such as IEEE GLOBECOM 2009 and IEEE VTC Spring-2009. Her research interests include MIMO, OFDM, equalization, blind source separation, cooperative communications, and cross-layer optimization, etc.

Said E. El-Khamy received the BSc (Honors) and MSc degrees from the Alexandria University, Alexandria, Egypt, in 1965 and 1967, respectively, and the PhD degree from the University of Massachusetts, Amherst, U.S.A., in 1971. He joined the teaching staff of the Department of Electrical Engineering, Faculty of Engineering, Alexandria University, Alexandria, Egypt since 1972 and was appointed as a Full time Professor in 1982 and as the Chairman of the Electrical Engineering Department from September 2000 to September 2003.

He is currently an Emeritus Professor.Prof El-Khamy has published more than three hundreds scientific papers in national and international conferences and journals and took part in the organization of many local and international conferences. His current research areas of interest include Spread-Spectrum Techniques, Mobile and Personal Communications, Wave Propagation in different media, Smart Antenna Arrays, Space–Time Coding, Modern Signal Processing Techniques and their applications in Image Processing, Communication Systems, Antenna design, and Wave Propagation problems. Prof El-Khamy is a Fellow member of the IEEE since 1999. He received many prestigious national and international prizes and awards including the State Appreciation Award (Al-Takderia) of Engineering Sciences for 2004, the most cited paper award from Digital Signal Processing journal for 2008, the IEEE R.W.P. King best paper award of the Antennas and Propagation Society of IEEE, in 1980, the A. Schuman's-Jordan's award for Engineering Research in 1982. He is also a Fellow of the Electromagnetics Academy and a member of Tau Beta Pi, Eta Kappa Nu, and Sigma Xi.

Moawad I. Dessouky received the BSc (Honors) and MSc degrees from the Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1976 and 1981, respectively, and the PhD from the McMaster University, Canada, in 1986. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1986. He has published more than 140 scientific papers in national and international conference proceedings and journals. He is currently the head of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University. He has received the most cited paper award from Digital Signal Processing journal for 2008. His current research areas of interest include spectral estimation techniques, image enhancement, image restoration, superresolution reconstruction of images, satellite communications, and spread spectrum techniques.

Sami A. El-Dolil received his BSc and MSc degrees in Electronic Engineering from the Menoufia University, Menouf, Egypt, in 1977 and 1981, respectively. In 1986 he joined the Communications Research Group at the Southampton University, Southampton, England, as a Research Student doing research on teletraffic analysis for mobile radio communication. He received his PhD degree from the Menoufia University, Menouf, Egypt, in 1989. He was a Post Doctor Research Fellow at the Department of Electronics and Computer Science, University of Southampton, 1991–1993. He is now a professor at the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt. His current research interests are in high-capacity digital mobile systems and multimedia networks.

Fathi E. Abd El-Samie received the BSc (Honors), MSc, and PhD from the Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1998, 2001, and 2005, respectively. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 2005. He is a co-author of about 70 papers in national and international conference proceedings and journals. He has received the most cited paper award from Digital Signal Processing journal for 2008. His current research areas of interest include image enhancement, image restoration, image interpolation, superresolution reconstruction of images, data hiding, multimedia communications, medical image processing, optical signal processing, and digital communications.

البحث رقم (6)

Puplished In:

International Journal of Electronics
2012, 1–14, iFirst

Title

A chaotic interleaving scheme for continuous-phase modulation-based orthogonal frequency-division multiplexing systems

Emad S. Hassana*, Xu Zhub, Said E. El-Khamyc, Moawad I. Dessoukya, Sami A. El-Dolila and Fathi E. Abd El-Samiea
aDepartment of Electronics and Electrical Communications,
Faculty of Electronic Engineering,
Menoufia University, 32952, Egypt;
bDepartment of Electrical Engineering and Electronics,
The University of Liverpool, Liverpool, L69 3GJ, UK;
cDepartment of Electrical Engineering,
Faculty of Engineering, Alexandria University,
Alexandria, 21544, Egypt
(Received 8 December 2010; final version received 11 March 2012)

Abstract

In this article, we propose a chaotic interleaving scheme for continuous-phase modulation-based orthogonal frequency-division multiplexing (CPM-OFDM) systems. The idea of chaotic maps randomisation (CMR) is exploited in this scheme. CMR generates permuted sequences from the sequences to be transmitted with lower correlation among their samples, and hence a better Bit Error Rate (BER) performance can be achieved. The proposed CMR-CPM-OFDM system combines the advantages of frequency diversity and power efficiency from CPMOFDM and performance improvement from chaotic interleaving. The BER performance of the CPM-OFDM system with and without chaotic interleaving is evaluated by computer simulations. Also, a comparison between chaotic interleaving and block interleaving is performed. Simulation results show that, the proposed chaotic interleaving scheme can greatly improve the performance of CPM-OFDM systems. Furthermore, the results show that the proposed chaotic interleaving scheme outperforms the traditional block interleaving scheme for CPM-OFDM systems. The results show also that, the proposed CMRCPM- OFDM system provides a good trade-off between system performance and bandwidth efficiency.

Keywords:

chaotic interleaving; frequency-domain equalisation; continuousphase

modulation; OFDM

References

Barbieri, A., Fertonani, D., and Colavolpe, G. (2009), 'Spectrally Efficient Continuous Phase
Modulations', IEEE Transactions on Wireless Communications, 8, 1564–1572.
Benedetto, S., Montorsi, G., Perotti, A., and Tarable, A. (2007), 'Optimization of CPM Pragmatic
Capacity', IEEE GLOBECOM 2007, 2, 1421–1425.
Castello, D.J., Hagenauer, J., Imai, H., and Wicker, S.B. (1998), 'Applications of Error-control
Coding', IEEE Transactions on Information Theory, 44, 2531–2560.
Deffeyes, K.S. 'Encryption System and Method', US Patent, No. 5001754, March 1991.
Fridrich, J. (1998), 'Symmetric Ciphers Based on Two-dimensional Chaotic Maps', International
Journal of Bifurcation and Chaos, 8, 1259–1284.
Han, F., Yu, X., and Han, S. (2006), 'Improved Baker Map for Image Encryption', ISSCAA, 4,
1273–1276.
Jovic, B., and Unsworth, C. (2007), 'Chaos-based Multi-user Time Division Multiplexing
Communication System', IET Communications, 1, 549–555.
Kiviranta, M., Mammela, A., Cabric, D., Sobel, D.A., and Brodersen, R.W. (2005), 'Constant
Envelope Multicarrier Modulation: Performance Evaluation in AWGN and Fading Channels',
IEEE Milcom, 2, 807–813.

Matthews, R. (1989), 'On the Derivation of a Chaotic Encryption Algorithm', Cryptologia XIII, 1, 29–42.
Nee, R.V., and Prasad, R. (2000), OFDM for Wireless Multimedia Communications, Boston,
London: Artech House.
Nguyen, V.D., and Kuchenbecker, H. (2001), 'Block Interleaving for Soft Decision Viterbi Decoding
in OFDM Systems', IEEE VTC, 1, 470–474.
Pancaldi, F., and Vitetta, G.M. (2006), 'Equalization Algorithms in the Frequency Domain for
Continuous Phase Modulations', IEEE Transactions on Communications, 54, 1435–1445.
Proakis, J.G., and Manolakis, D.G. (1996), Digital Signal Processing: Principles, Algorithms, and
Applications (3rd ed.), NJ: Prentice Hall.
Proakis, J.G., and Salehi, M. (1994), Communication Systems Engineering, New Jersey: Prentice
Hall.
Schulze, H., and Luders, C. (2005), Theory and Application of OFDM and CDMA Wideband Wireless
Communication, John Wiley: Sussex, UK.
Shi, Y.Q., Zhang, X.M., Ni, Z.-C., and Ansari, N. (2004), 'Interleaving for combating bursts of
errors', IEEE Circuts and Systems Magazine, 4, 29–42.
Thillo, W., Horlin, F., Nsenga, J., Ramon, V., Bourdoux, A., and Lauwereins, R. (2009),
'Low-complexity Linear Frequency Domain Equalization for Continuous Phase Modulation',
IEEE Transactions on Wireless Communications, 8, 1435–1445.
Thompson, S.C., and Ahmed, A.U. (2008), 'Constant-envelope OFDM', IEEE Transactions on
Communications, 56, 1300–1312.
Thompson, S.C., Ahmed, A.U., Proakis, J.G., and Zeidler, J.R. (2004), 'Constant Envelope OFDM
Phase Modulation: Spectral Containment, Signal Space Properties and Performance', IEEE
Milcom, Monterey, 2, 1129–1135.
Thompson, S.C., Proakis, J.G., Zeidler, J.R., and Geile, M. (2006), 'Constant-envelope OFDM in
Multipath Rayleigh Fading Channels', IEEE Milcom, 1, 1–7.

Tsai, Y., Zhang, G., and Pan, J.-L. (2005), ‘Orthogonal Frequency Division Multiplexing with Phase
Modulation and Constant Envelope Design’, IEEE Milcom, 4, 2658–2664.

البحث رقم (7)

Puplished In

J. Cent. South Univ. (2012) 19: 1902□1908
DOI: 10.1007/s11771-012-1224-x

Title

Peak-to-average power ratio reduction using selective mapping with unequal power distribution

E. S. Hassan[1], XU Zhu[2], S. E. El-Khamy[3], M. I. Dessouky[1], S. A. El-Dolil[1], F. E. Abd El-Samie[1]
1. Department of Electronics and Electrical Communications, Faculty of Electronic Engineering,
Menoufia University, Menouf 32952, Egypt;
2. Department of Electrical Engineering and Electronics, The University of Liverpool, Liverpool L69 3GJ, UK;
3. Department of Electrical Engineering, Faculty of Engineering,
Alexandria University, Alexandria 21544, Egypt

Abstract:

A new approach for peak-to-average power ratio (PAPR) reduction in orthogonal frequency division multiplexing (OFDM) systems was proposed. This approach is based on assigning powers to the different subcarriers of OFDM using an unequal power distribution strategy. In addition, a reduced complexity selective mapping (RC-SLM) scheme was proposed. The proposed scheme is based on partitioning the frequency domain symbol sequence into several sub-blocks, and then each sub-block is multiplied by different phase sequences whose length is shorter than that used in the conventional SLM scheme. Then, a kind of low complexity conversions is used to replace the IFFT blocks. The performance of the proposed RC-SLM scheme along with the new approach was studied with computer simulation. The obtained results show that the proposed RC-SLM scheme is able to achieve the lowest computational complexity when compared with other low complexity schemes proposed in the literature while at the same time improves the PAPR reduction performance by about 0.3 dB.

Key words:

orthogonal frequency division multiplexing (OFDM); peak-to-average power ratio (PAPR); computational complexity; selective mapping scheme

References:

[1] NEE R V, PRASAD R. OFDM for wireless multimedia communications [M]. Artech House, 2000: 33−62.

[2] SCHULZE H, LUDERS C. Theory and application of OFDM and CDMA wideband wireless communication [M]. John Wiley, 2005: 145−263.
[3] HAN S, LEE J. An overview of peak-to-average power ratio reduction techniques for multicarrier transmission [J]. IEEE Trans on Wireless Commun, 2005, 12: 56−65.
[4] SLIMANE S B. Reducing the peak-to-average power ratio of OFDM signals through precoding [J]. IEEE Trans on Veh Techn, 2007, 56: 686−695.
[5] KOHANDANI F, KHANDANI A. A new algorithm fo peak/average power reduction in OFDM systems [J]. IEEE Trans on Brodcasting, 2008, 54: 159−165.
[6] HASSAN E S, EL-KHAMY S E, DESSOUKY M I, EL-DOLIL S A, ABD EL-SAMIE F E. A simple selective mapping algorithm for the peak to average power ratio in space time block coded MIMO-OFDM systems [C]// Proc HPCNCS-08. Orlando, FL, USA, 2008: 103−106.
[7] LEE Y, YOU Y, JEON W, PAIK J, SONG H. Peak-to-average power ratio in MIMOOFDM systems using selective mapping [J]. IEEE Comm Letters, 2003, 7: 575−577.
[8] CHEN H, LIANG H. Combined selective mapping and binary cyclic codes for PAPR reduction in OFDM systems [J]. IEEE Trans on Wireless Comm, 2007, 6: 3524−3528.
[9] HASSAN E S, EL-KHAMY S E, DESSOUKY M I, EL-DOLIL S A, ABD EL-SAMIE F E. Peak-to-average power ratio reduction in space-time block coded multi-input multi-output orthogonal frequency division multiplexing systems using a small overhead selective mapping scheme [J]. IET Commun, 2009, 3(10): 1667−1674.
[10] YANG L, SOO K, SIU Y M, LI S Q. A low complexity selected mapping scheme by use of time domain sequence superposition technique for PAPR reduction in OFDM system [J]. IEEE Transactions on Broadcasting, 2008, 54(4): 821−824.
[11] WANG C, OUYANG Y. Low-complexity selected mapping schemes for peak-to-average power ratio reduction in OFDM systems [J]. IEEE Trans Signal Process, 2005, 53(12): 4652−4660.
[12] JIE Y, LEI C, QUAN L, DE C. A modified selected mapping technique to reduce the peak-to-average power ratio of OFDM signal [J]. IEEE Transactions on Consumer Electronics, 2007, 53(3): 846−851.
[13] TELLAMBURA C. Computation of the continuous-time PAR of an OFDM signal with BPSK subcarriers [J]. IEEE Commun Lett, 2001, 5(5): 185−187.
[14] JIANG T, GUIZANI M, CHEN H, XIANG W, WU Y. Derivation of PAPR distribution of the peak-to-average power ratio in OFDM signals [J]. IEEE Trans on Wireless Comm, 2008, 7: 1298−1305.

[15] ALSUSA E, YANG L. Selective post-IFFT amplitude randomizing for peak-to-average power ratio reduction in orthogonal frequency-division multiplexing based systems [J]. IET Commun, 2008, 2(4): 553−561.
[16] HASSAN E S, EL-KHAMY S E, DESSOUKY M I, EL-DOLIL S A, ABD EL-SAMIE F E. Peak to average power ratio reduction for OFDM signals with unequal power distribution strategy and the selective mapping technique [C]// Proc NRSC-2010. Egypt, 2010: 1−9.
[17] WANG S, LI C. A low-complexity PAPR reduction scheme for SFBC MIMO-OFDM systems [J]. IEEE Signal Proc, 2009, 16(11): 941−944.

البحث رقم (8)

Puplished In:

Wireless Pers Commun (2012) 62:183–199
DOI 10.1007/s11277-010-0047-z

Title

A Chaotic Interleaving Scheme for the Continuous Phase Modulation Based Single-Carrier Frequency-Domain Equalization System

Emad S. Hassan · Xu Zhu · Said E. El-Khamy ·
Moawad I. Dessouky · Sami A. El-Dolil · Fathi E. Abd El-Samie
Published online: 11 June 2010

E. S. Hassan · M. I. Dessouky · S. A. El-Dolil · F. E. A. El-Samie (B)
Department of Electronics and Electrical Communications,
Faculty of Electronic Engineering,
Menoufia University, Menouf 32952, Egypt
e-mail: fathi_sayed@yahoo.com
E. S. Hassan
e-mail: eng_emadash@yahoo.com
M. I. Dessouky
e-mail: dr_moawad@yahoo.com
S. A. El-Dolil
e-mail: msel_dolil@yahoo.com
X. Zhu
Department of Electrical Engineering and Electronics,
University of Liverpool, Liverpool L69 3GJ, UK
e-mail: xuzhu@liverpool.ac.uk
S. E. El-Khamy
Department of Electrical Engineering, Faculty of Engineering, Alexandria University,
Alexandria 21544, Egypt
e-mail: elkhamy@ieee.org

Abstract:

In this paper, we propose a chaotic interleaving scheme for the continuous phase modulation based single-carrier frequency-domain equalization (CPM-SCFDE) system. Chaotic interleaving is used in this scheme to generate permuted versions from the sample sequences to be transmitted, with low correlation among their samples, and hence a better bit error rate (BER) performance can be obtained. The proposed CPM-SC-FDE system with chaotic interleaving combines the advantages of the frequency diversity, the low complexity, and the high power efficiency of the CPMSC- FDE system and the performance improvements due to chaotic interleaving. The BER performance of the CPM-SC-FDE system with and without chaotic interleaving is evaluated by computer simulations. Also, a comparison between the proposed chaotic interleaving and the conventional block interleaving is performed. Simulation results show that, the proposed chaotic interleaving scheme can greatly improve the performance of the CPM-SC-FDE system. Furthermore, the results show that this scheme outperforms the conventional block

Keywords :

SC-FDE · CPM · Chaotic interleaving · Frequency-domain equalization

References:

1. Falconer, D., Ariyavisitakul, S., Benyamin-Seeyar, A., & Eidson, B. (2002). Frequency domain equalization for single-carrier broadband wireless systems. IEEE Communications and Magagement, 40(4), 58–66.
2. Gusmo, A., Dinis, R., & Esteves, N. (2003). On frequency-domain equalization and diversity combining for broadband wireless communications. IEEE Communication Letters, 51(7), 1029–1033.
3. Pancaldi, F., Vitetta, G., Kalbasi, G. R., Al-Dhahir, N., Uysal, M., & Mheidat, H. (2008). Single-carrier frequency domain equalization. IEEE Signal Processing Magazine, 25(5), 37–56.
4. Sari, H., Karam, G., & Jeanclaude, I. (1995). Transmission techniques for digital terrestrial TV broadcasting. IEEE Communications Magazine, 33(2), 100–109.
5. Zhu, X., & Murch, R. (2004). Layered space-frequency equalization in a single-carrier MIMO system for frequency-selective channels. IEEE Transaction on Wireless Communicaions, 3, 701–708.
6. Nee, R. V., & Prasad, R. (2000). OFDM for wireless multimedia communications. Norwood: Artech House.
7. Schulze, H., & Luders, C. (2005). Theory and application of OFDM and CDMA wideband wireless communication. New York: John Wiley.
8. Anderson, J., Aulin, T., & Sundeberg, C. (1986). Digital phase modulation. New York: Plennum Press.
9. Kiviranta, M., Mammela, A., Cabric, D., Sobel, D. A., & Brodersen, R. W. (2005). Constant envelope multicarrier modulation: Performance evaluation in AWGN and fading channels. IEEE Milcom, 2, 807–813.
10. Thompson, S. C., & Ahmed, A. U. (2008). Constant-envelope OFDM. IEEE Transaction on Communications, 56(8), 1300–1312.
11. Buzid, T., & Huemer, M. (2009). Single carrier transmission with frequency domain equalization (SC/FDE) system with a PAPR of unity. In Proceedings of ICACT-09 (Vol. 1, pp. 459–462). Feb. 2009
12. Tsai, Y., Zhang, G., & Pan, J.-L. (2005). “Orthogonal frequency division multiplexing with phase modulation and constant envelope design”. In IEEE Milcom, 4, 2658–2664.
13. Thillo, W., Horlin, F., Nsenga, J., Ramon, V., Bourdoux, A., & Lauwereins, R. (2009). Low-complexity linear frequency domain equalization for continuous

phase modulation. IEEE Transactions on Wireless Communications, 8(3), 1435–1441.
14. Pancaldi, F., & Vitetta, G. M. (2006). Equalization algorithms in the frequency domain for continuous phase modulations. IEEE Transactions on Communications, 54(4), 648–658.
15. Hassan, E. S., Zhu, X., El-Khamy, S. E., Dessouky, M. I., El-Dolil, S. A., & Abd El-Samie, F.E. (2009). A continuous phase modulation single-carrier wireless system with frequency domain equalization. In Proceedings of ICCES-09, Cairo, Egypt, 14–16 Dec. 2009.
16. Hassan, E. S., Zhu, X., El-Khamy, S. E., Dessouky, M. I., El-Dolil, S. A., & Abd El-Samie, F.E. (2010). Performance evaluation of OFDM and single-carrier systems using frequency domain equalization and phase modulation. International Journal of Communication Systems (in press).
17. Barbieri, A., Fertonani, D., & Colavolpe, G. (2009). Spectrally efficient continuous phase modulations. IEEE Transactions on Wireless Communications, 8(3), 1564–1572.
18. Castello, D.J., Hagenauer, J., Imai, H., & Wicker, S. (1998). Applications of error-control coding. IEEE Transactions on Information Theory, 44, 2531–2560.
19. Shi, Y. Q., Zhang, X. M., Ni, Z.-C., & Ansari, N. (2004). Interleaving for combating error bursts. IEEE Circuts and systems magazine, 4, 29–42 (First Quarter 2004).
20. Nguyen, V. D., & Kuchenbecker, H. (2001). Block interleaving for soft decision viterbi decoding in ofdm systems. In IEEE VTC (Vol. 1, pp. 470–474). 2001.
21. Jovic, B., & Unsworth, C. (2007). Chaos-based multi-user time division multiplexing communication system. IET Communications, 1(4), 1751–8628.
22. Matthews, R. (1998). On the derivation of a chaotic encryption algorithm. Cryptologia XIII, 1, 29–41.
23. Deffeyes, K. S. (1991). Encryption system and method. US Patent, no. 5001754, March 1991.
24. Fridrich, J. (1998). Symmetric ciphers based on two-dimensional chaotic maps. International Journal of Bifurcation and Chaos, 8, 1259–1284.
25. Han, F., Yu, X., & Han, S. (2006). Improved baker map for image encryption," in ISSCAA, 2006, pp. 1273–1276.
26. Hassan, E. S., El-Khamy, S. E., Dessouky, M. I., El-Dolil, S. A., & Abd El-Samie, F. E. (2009). New interleaving scheme for continuous phase modulation based OFDM systems using chaotic maps. In Proceedings of WOCN-09, Cairo, Egypt, 28–30 April 2009.
27. Proakis, J. G., & Manolakis, D. G. (1996). Digital signal processing: Principles, algorithms, and applications (3rd edn). NJ: Prentice Hall.

28. Proakis, J. G., & Salehi, M. (1994). Communication Systems Engineering. New Jersey: Prentice Hall.

Author Biographies

Emad S. Hassan received the B.Sc. and M.Sc. degrees in Electrical Engineering from Menoufia University, Egypt in 2003 and 2006, respectively. He is currently an Assistant Lecturer in the Dept. of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University. In 2008, he joined the Communications Research Group at Liverpool University, Liverpool, UK, as a Visitor Research Student doing research on wireless communication. He is currently working towards the Ph.D. degree in Communications Engineering from the Menoufia University. His areas of interests are CDMA, OFDM, SC-FDE, MIMO and CPM based systems.

Xu Zhu received the B.Eng. degree (with first class honors) from the Huazhong University of Science and Technology, Wuhan, China, in 1999, and the Ph.D. degree from the Hong Kong University of Science and Technology, Hong Kong, in 2003, both in Electrical and Electronic Engineering. Since May 2003, she has been with the Department of Electrical Engineering and Electronics, the University of Liverpool, Liverpool, U.K., where she is currently a lecturer. Dr. Zhu was the vice chair of the 2006 and 2008 ICA Research Network International Workshops, which were held in Liverpool, U.K. She has served as a session chair and a technical program committee member for various conferences, such as IEEE GLOBECOM 2009 and IEEE VTC

Spring-2009. Her research interests include MIMO, OFDM, equalization, blind source separation, cooperative communications and crosslayer optimization, etc.

Said E. El-Khamy received the B.Sc. (Honors) and M.Sc. degrees from Alexandria University, Alexandria, Egypt, in 1965 and 1967 respectively, and the Ph.D. degree from the University of Massachusetts, Amherst, USA, in 1971. He joined the teaching staff of the Department of Electrical Engineering, Faculty of Engineering, Alexandria University, Alexandria, Egypt, since 1972 and was appointed as a Full-time Professor in 1982 and as the Chairman of the Electrical Engineering Department from September 2000 to September 2003. He is currently an Emeritus Professor. Prof. El-Khamy has published more than three hundreds scientific papers in national and international conferences and journals and took part in the organization of many local and international conferences. His Current research areas of interest include Spread-Spectrum Techniques, Mobile and Personal Communications, Wave Propagation in different media, Smart Antenna Arrays, Space-Time Coding, Modern Signal Processing Techniques and their applications in Image Processing, Communication Systems, Antenna design and Wave Propagation problems. Prof. El-Khamy is a Fellow member of the IEEE since 1999. He received many prestigious national and international prizes and awards including the State Appreciation Award (Al-Takderia) of Engineering Sciences for 2004, the most cited paper award from Digital Signal Processing journal for 2008, the IEEE R.W.P. King best paper award of the Antennas and Propagation Society of IEEE, in 1980, the the A. Schuman's-Jordan's award for Engineering Research in 1982. He is also a Fellow of the Electromagnetics Academy and a member of Tau Beta Pi, Eta Kappa Nu and Sigma Xi.

Moawad I. Dessouky received the B.Sc. (Honors) and M.Sc. degrees from the Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1976 and 1981, respectively, and the Ph.D. from McMaster University, Canada, in 1986. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1986. He has published more than 140 scientific papers in national and international conference proceedings and journals. He is currently the head of the Dept. Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University. He has received the most cited paper award from Digital Signal Processing journal for 2008. His current research areas of interest include spectral estimation techniques, image enhancement, image restoration, super resolution reconstruction of images, satellite communications, and spread spectrum techniques.

Sami A. El-Dolil received his B.Sc. and M.Sc. degrees in Electronic Engineering from Menoufia University, Menouf, Egypt, in 1977 and 1981, respectively. In 1986 he joined the Communications Research Group at Southampton University, Southampton, England, as a Research Student doing research on teletraffic analysis for mobile radio communication. He received his Ph.D. degree from Menoufia University, Menouf, Egypt, in 1989. He was a Post Doctor Research Fellow at the Department of Electronics and Computer Science, University of Southampton, 1991–1993. He is working as a Professor at the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt. His current research interests are in high-capacity digital mobile systems and multimedia networks.

Fathi E. Abd El-Samie received the B.Sc. (Honors), M.Sc., and Ph.D. from the Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1998, 2001, and 2005, respectively. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 2005. He is a co-author of about 100 papers in national and international conference proceedings and journals. He has received the most cited paper award from Digital Signal Processing journal for 2008. His current research areas of interest include image enhancement, image restoration, image interpolation, super resolution reconstruction of images, data hiding, multimedia communications, medical image processing, optical signal processing, and digital communications.

البحث رقم (9)

Puplished In:

Wireless Pers Commun
DOI 10.1007/s11277-012-0622-6

Title

Efficient Image Transmission with Multi-Carrier CDMA

E. M. El-Bakary · E. S. Hassan · O. Zahran ·
S. A. El-Dolil · F. E. Abd El-Samie

E. M. El-Bakary F. E. Abd El-Samie (B) E. S. Hassan O. Zahran S. A. El-Dolil
Department of Electronics and Electrical Communications, Faculty of Electronic Engineering,
Menoufia University, Menouf, 32952, Egypt
e-mail: fathi_sayed@yahoo.com
E. M. El-Bakary
e-mail: eman_elbakary449@yahoo.com
E. S. Hassan
e-mail: eng_emadash@yahoo.com
O. Zahran
e-mail: osama_zahran@menofia.edu.eg
S. A. El-Dolil
e-mail: msel_dolil@yahoo.com

Abstract :

This paper presents a new approach for efficient image transmission overMulti-Carrier Code Division Multiple Access (MC-CDMA) systems using chaotic interleaving. The chaotic interleaving scheme based on Baker map is applied on the image data prior to transmission. The proposed approach transmits images over wireless channels, efficiently, without posing significant constraints on the wireless communication system bandwidth and noise. The performance of the proposed approach is further improved by applying Frequency- Domain Equalization (FDE) at the receiver. Two types of frequency-domain equalizers are considered and compared for performance evaluation of the proposed MC-CDMA system; the Zero-Forcing equalizer and the Linear Minimum Mean Square Error (LMMSE) equalizer.Several experiments are carried out to test the performance of the image transmission with different sizes over the proposed MC-CDMA system. Simulation results show that image transmission over wireless channels using the proposed chaotic interleaving approach is much more immune to noise and fading. Moreover this chaotic interleaving process adds a degree of encryption to the transmitted data. The results also show a noticeable performance improvement in terms of the Root Mean Square Error and Peak Signal-to Noise Ratio values when applying FDE in the proposed approach, especially with the LMMSE equalizer.

Keywords:

MC-CDMA Chaotic interleaving FDE

References

1. Rappaport, T. S. (2002). Wireless communications principles and practice, 2nd edn. New Jersey: Pearson Education.
2. Nee, R. V., & Prasad, R. (2000). OFDM for wireless multimedia communications. London: Artech House.
3. Schulze, H., & Luders, C. (2005). Theory and applications of OFDM and CDMA. New York: Wiley.
4. Hanzo, L., Yang, L., Kuan, E., & Yen, K. (2003). Single and multi-carrier DS-CDMA: Multi-user detection, space-time spreading, synchronisation, networking and standards. New York: Wiley.
5. Fazel, K., & Kaiser, S. (2003). Multi-carrier and spread spectrum systems. Chichester: Wiley.
6. Hara, S., & Prasad, R. (1997). Overview of multi-carrier CDMA. IEEE Cornmunicolionc

Magmine, 35, 126–133.
7. Verdu, S. (1998). Multi-user detection. Cambridge, UK: Cambridge University Press.
8. Dang, P. P., & Chau, P. M. (2000). Robust image transmission over CDMA channels. IEEE Trans on Consumer Electronics, 46, 3.
9. Kathiyaiah, T., & Oh, T. H. (2009). Performance analysis of JPEG2000 transmission through low SNR MC-CDMA Channel. In Proceedings of IEEE 9th international conference on communications, pp. 15–17, Malaysia.
10. Rogers, J. K., & Cosman, P. C. (1998). Wavelet zerotree image compression with packetization. IEEE Signal Processing Letters, 5(5), 105–107.
11. Proakis, J. G. (1995). Digital communications, 3rd edn. New York: McGraw-Hill.
12. Shi, Y. Q., Zhang, X. M., Ni, Z. C., & Ansari, N. (2004). Interleaving for combating bursts of errors. In IEEE circuts and systems magazine (Vol. 4). First Quarter.
13. Nguyen, V. D., & Kuchenbecker, H. (2001). Block interleaving for soft decision viterbi decoding in ofdm systems. In IEEE VTC (pp. 470–474).
14. Sung, C. K., Heo, J., & Lee, I. (2007). Adaptive bit-interleaved coded OFDM with reduced feedback information. IEEE Transactions on Communications, 55(9), 1649–11655.
15. Jovic, B., & Unsworth, C. (2007). Chaos-based multi-user time division multiplexing communication system. IET Communications, 1, 4.
16. Matthews, R. (1989). On the derivation of a chaotic encryption algorithm. Cryptologia XIII (Vol. 1).
17. Fridrich J. (October 1998). Symmetric ciphers based on two-dimensional chaotic maps. International Journal of Bifurcation and Chaos, 8, 1259–1284.
18. Han, F., Yu, X., & Han, S. (2006). Improved baker map for image encryption. In ISSCAA (pp. 1273–1276).
19. Hassan, E. S., El-Khamy, S. E., Dessouky, M. I., El-Dolil, S. A., Abd El-Samie, F. E. (2009). New interleaving scheme for continuous phase modulation based OFDM systems using chaotic maps. In Proceedings of WOCN-09, Cairo, Egypt, pp. 28–30.
20. Hassan, E. S., El-Khamy, S. E., Dessouky, M. I., El-Dolil, S. A., & Abd El-Samie, F. E. (2012). Chaotic interleaving scheme for continuous phase modulation based single-carrier frequency-domain equalization systems. Wireless Personal Communications, 62(1), 183–199.
21. Fazel, K., & Kaiser, S. (2003). Multi carrieir and spread spectrum systems. New York: Wiley.
22. Klein, A. (1997). Data detection algorithms specially designed for the downlink of CDMA mobile radio systems. Proceedings of IEEE VTC, 1, 203–207.

23. IEEE 802.16 Broadband Wireless Access Working Group. (2001). Channel models for fixed wireless applications. IEEE 802.16a.3c-01/01.
24. Yuan, D., Wang, C., & Yao, Q. (1999). Two novel interleaving schemes of the (2,1,3) convolutional code and its performance in the mobile image communication system. In Proceedings of IEEE military communications xonference, MILCOM.
25. Subramanya, S. R., & Sabharwalz, C. (2001). Performance evaluation of hybrid coding of images using wavelet transform and predictive coding. In Proceedings of ICCIMA.

Author Biographies

E. M. El-Bakary received the M.Sc. degree from the Faculty of Electronic Engineering, Menoufia University, Egypt, in 2011. Her current research areas of interest include image communication and CDMA systems.

E. S. Hassan received the B.Sc. (Honors), M.Sc., and Ph.D. from the Faculty of Electronic Engineering, Menoufia University, Egypt, in 2003, 2006, and 2010, respectively. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Egypt, in 2010. In 2008, he joined the Communications Research Group at Liverpool University, Liverpool, UK, as a Visitor Researcher. His current research areas of interest include image processing, digital communications, cooperative communication, cognitive radio networks, OFDM, SC-FDE, MIMO and CPM based systems.

O. Zahran received the B.Sc. (Honors), M.Sc. from the Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1997, 1999 respectively, and the Ph.D. from Liverpool university, UK. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt. He is a co-author of about 29 papers in national and international conference proceedings and journals. His current research areas of interest include Nanoscale devices, expert systems, artificial intelligence and hybrid intelligent systems.

S. A. El-Dolil received his B.Sc. and M.Sc. degrees in Electronic Engineering from Menoufia University, Menouf, Egypt, in 1977 and 1981, respectively. In 1986 he joined the Communications Research Group at Southampton University, Southampton, England, as a Research Student doing research on teletraffic analysis for mobile radio communication. He received his Ph.D. degree from Menoufia University, Menouf, Egypt, in 1989. He was a Post Doctor Research Fellow at the Department of Electronics and Computer Science, University of Southampton, 1991–1993. He is working as a Professor at the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt. His current research interests are in high capacity digital mobile systems and multimedia networks.

F. E. Abd El-Samie received the B.Sc. (Honors), M.Sc., and Ph.D. from the Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1998, 2001, and 2005, respectively. He joined the teaching staff of the Department of Electronics and Electrical

Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 2005. He is a co-author of about 160 papers in international conference proceedings and journals. He has received the most cited paper award from Digital Signal Processing journal for 2008. His current research areas of interest include image enhancement, image restoration, image interpolation, and super resolution reconstruction of images, data hiding, multimedia communications, medical image processing, optical signal processing, and digital communications.

Conferences papers

البحث رقم (1)

Puplished In:

The 8th International Conference on INFOrmatics and Systems (INFOS2012) - 14-16 May
Computer Networks Track

Title

Modified Short Multipath Insensitive Code Loop Discriminator

A. I. Mustafa', S. S. EI-Sheikh!, and X. Zhu3
IDept. of Time and Frequency National Institute of Standards
Harram, Giza, Egypt.
Email: eng_ali_8587@yahoo.com. And ssamuel71@hotmail.com.
3Dept. of Electrical Engineering and Electronics
University of Liverpool Liverpool, UK.
Email: xuzhu@liv.ac.uk.

E. S. Hassarr2، 4, K. H. Awadalla2, and F. E. Abd El-Samie2/
2Dept. of Electronics and Electrical Comm.
Faculty ofElectronic Eng., Menoufia Univ., 32952, Menouf,
EGYPT.
Email: {eng_emadash.fathi_sayed}@yahoo.com.
kamal_awadalla @hotmail.com.
4Dept. of Electrical Eng., Faculty of Engineering,
Jazan University,
Jazan, KSA.
Email: eshassan@jazanu.edu.sa.

Abstract:

Several studies have been carried out to minimize the multipath error effects in Global Positioning System (GPS) receiver. Most of these studies achieve an acceptable performance with medium and long relative delay multipaths. In this paper we propose a Modified Short Multipath Insensitive Code Loop

Discriminator (MSMICLD) using an Early minus Late (E-L) envelope discriminator function. The proposed discriminator is insensitive to short multipaths that have a relative delay less than 0.5 chips. The MSMICLD is modeled using MATLAB and its performance is evaluated with and without multipaths for three different types of receivers; infinite pre-correlation (front-end) bandwidth (BW), 2 MHz pre-correlation BW, and 8 MHz pre-correlation BW. Moreover, the performance of the proposed MSMICLD is compared with the conventional SMICLD. Simulation results show that the MSMICLD has the ability to mitigate the short multipaths effect in the three cases. The obtained results also show that for in-phase multipaths, the performance of the proposed discriminator outperforms the conventional SMICLD with a lower computational load.

Keywords:

GPS, MSMICLD, Multipath error.

REFERENCES

[1] E. D .Kaplan, C. 1. Hegatry, "Understanding GPS: Principles and Applications," 2nd ed., Boston: Artech House, pp279-295, 1996.
[2] N. Jardak, A. Verisch-Picois, and N. Samama,"Multipath Insensitive Delay Lock Loop in GNSS Receivers," IEEE Trans on Aerospace and Electron.Syst., vol. 47, no. 4, pp. 2590-2609, Oct. 2011.
[3] A. J. Van Dierendonck, P. Fenton, and T. Ford, "Theory and Performance of Narrow Correlator Spacing in a GPS Receiver," Navigation: Journal of The Institute OfNavigation, vol. 39, no. 3, pp. 265- 283, Fall 1992.
[4] B. R. Townsend, and P. C. Fenton, "A Practical Approach to the Reduction of Pseudo range Multipath Errors in a LI GPS Receiver," proc ofION GPS-94, Salt Lake city, UT, pp. 143-148,20-23 Sept. 1994.
[5] R. D. J. van Nee, "The Multipath Estimating Delay Lock Loop," proc of IEEE 2nd International Symposium on Spread Spectrum Techniques and Applications, Yokohama, Japan, pp. 39-42,29 Nov.-2 Dec. 1992 .
[6] R. D. 1. van Nee, 1. Siereveld, P. C. Fenton, and B. R. Townsend, "The Multipath Estimating Delay Lock Loop: Approaching Theoretical Accuracy Limits," proc of IEEE Position, Location and Navigation Symposium, Las Vegas, NY, pp. 48-64,1994.
[7] R. D. 1. van Nee, K. 1. Van Dierendonck, P. C. Fenton, and B. R. Townsend, "Performance Evaluation of The Multipath Estimating Delay Lock Loop," proc of ION national technical meeting, anaheim, California, pp. 1-7, 18-20 Jan. 1995.

[8] A. El-Rabbany, "Introduction to GPS: The Global Positioning System," Mobile Communications Series, Boston, London: Artech House, pp32-34, 2002.
[9] 1. Sleewaegen, and F. Boon, "Mitigating Short Delay Multipath: a Promising New Technique," Septenrio Satellite Navigation.
[10] N. Jardak, and N. Samama, "Short Multipath Insensitive Code Loop Discriminator," IEEE Trans on Aerospace and Electron.Syst., vol. 46, no. l,pp. 278-295, Jan. 2010.
[11] B. M. Hannah "Modeling and Simulation of GPS Multipath Propagation," PhD. Thesis, The Cooperative Research Centre for Satellite Systems, Queensland University of Technology, Mar. 2001.
[12] E. D .Kaplan, C. J. Hegatry, "Understanding GPS: Principles and Applications," 2nd ed., Boston: Artech House, ppl73-179, 1996.

البحث رقم (2)

Puplished In:

29th NATIONAL RADIO SCIENCE CONFERENCE (NRSC 2012)
April 10 -12, 2012, Faculty of Engineering/Cairo University, Egypt

Title

C31. Efficient Image Transmission Over the Single Carrier Frequency Division Multiple Access System Using Chaotic Interleaving

A. Elbehery1, S. A. S. Abdelwahab1, M. Abd EL Naby2 , E.S. Hassan3, S. Elaraby1
1 Engineering Department, Nuclear Research center, Atomic Energy Authority.
2 Faculty of Engineering, Tanta University.
3 Faculty of Electronic Engineering, Menoufia University, Menouf, 32952, Egypt.
E-mails: elbehery_82@hotmail.com, safeyash@yahoo.com, emad.hassan@el-eng.menofia.edu.eg,
mnaby@yahoo.com, selaraby@netscape.net, fathi_sayed@yahoo.com.

ABSTRACT:

Present day applications require various kinds of images and pictures as sources of information for interpretation and analysis.This paper studies the efficient image transmission over Single Carrier Frequency Division Multiple Access (SC-FDMA) system. In this paper, the performance of Discrete Fourier Transform (DFT) based SC-FDMA system and Discrete Cosine Transform (DCT) based SC-FDMA system is studied in order to select the proper technique for efficient image transmission. We also propose a chaotic interleaving scheme to be used with SC-FDMA for efficient image transmission. Simulation of both systems using Matlab program is presented, and the experimental results show that the DCT based SC-FDMA system achieves higher Peak Signal to Noise Ratio (PSNR) values in the received images than the DFT based SC-FDMA system due to its excellent spectral energy compaction property. Moreover, it uses only real arithmetics rather than the complex arithmetics used in the DFT based SC-FDMA system. Furthermore, the results show that the PSNR values are enhanced by the applying chaotic interleaving scheme in both systems.

Keywords:

SC-FDMA, DFT, DCT, Chaotic interleaving, PSNR.

REFERENCES:

[1] R. Prasad, "OFDM for wireless Communications Systems", Artech House, 2004.
[2] R. V. Nee and R. Prasad, "OFDM for Wireless Multimedia Communications", Artech House, 2000.
[3] J. A. Davis and J. Jedwab, “Peak-to-mean power control in OFDM, Golay complementary Sequences,” IEEE Trans. Inform. Theory, vol. 45, pp. 2397–2417, Nov. 1999.

[4] J. Armstrong, “Peak-to-average power reduction for OFDM by repeated clipping and frequency domain filtering,” IEE Electron. Lett., vol. 38, pp. 246–247, Feb. 2002.
[5] H. G. Myung, J. Lim, and D. Goodman, “Peak-to-average power ratio of single carrier FDMA signals with pulse shaping,” in Proc. IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), Sep. 2006.
[6] U. Sorger, I. D. Broeck, and M. Schnell,” IFDMA – a new spread spectrum multiple-access scheme in multi-carrier spread spectrum”. Netherlands: Kluwer Academic Publishers, 1997.
[7] H. Myung, J. Lim, and D. Goodman, “Single carrier FDMA for uplink wireless transmission,” IEEE Vehicular Tech. Magazine, vol. 1, pp. 30–38, Sep. 2006.
[8] M. Wylie-Green, E. Perrins and T. Svensson, "Design and Performance of a Multiple Access CPM-SC-FDMA Transmission Scheme", IEEE International WD&D Conference, 2009.
[9] G.D. Mandyam, “Sinusoidal transforms in OFDMA system,” IEEE Trans. On Broadcasting. vol. 50, no. 2, June 2004.
[10] P. Tan, N. C. Beaulieu, “A Comparison of DCT-Based OFDM and DFT-Based OFDM in frequency offset and fading channels,” IEEE Trans. On Commun., vol. 54, no. 11, Nov. 2006.
[11] F. S. Al-kamali, M. I. Dessouky, B. M. Sallam, F. Shawki, and F. E. Abd El-Samie, “A New Single Carrier FDMA System Based on the Discrete Cosine Transform,” in Proc.of the ICCES'9 Conference, Cairo, Egypt, pp. 555-560, 14-16 Dec. 2009.
[12] E.S. Hassan, Xu Zhu., S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, “A Chaotic Interleaving Scheme for the Continuous Phase Modulation Based Single-Carrier Frequency-Domain Equalization System”, Wireless Personal Communications, 2010.
[13] E. S.Hassan, S. E. El-Khamy, , M. I. Dessouky, , S. A. El-Dolil, , & F. E. Abd El-Samie, (2009). New interleaving scheme for continuous phase modulation based OFDM systems using chaotic maps. In Proceedings of WOCN-09, Cairo, Egypt, 28–30 April 2009.
[14] Hyung G. Myung and David J. Goodman, "Single carrier FDMA a new air interface for long term evolution", John Wiley & Sons, Ltd., 2008
[15] Wikipedia (http://en.wikipedia.org/wiki/Discrete_cosine_transform).
[16] J. Fridrich, (1998). Symmetric ciphers based on two-dimensional chaotic maps. International Journal of Bifurcation and Chaos, 8, 1259–1284.
[17] Shi, Y. Q., Zhang, X. M., Ni, Z.-C., & Ansari, N. (2004). Interleaving for combating error bursts. IEEE Circuts and systems magazine, 4, 29–42 (First Quarter 2004).

[18] Safey. A. S. Abdelwahab, I. I. Mahmoud and H. M. Frahat, “Image Compression Using a Fast 2-D DCT Algorithm”, International Conference on Industrial Electronics, Technology & Automation, Cairo, Egypt, 2001

البحث رقم (3)

Title

A Simple Selective Mapping Algorithm for the Peak to Average Power Ratio in Space Time Block Coded MIMO-OFDM Systems

Emad S. Hassan[1], Said E. El-Khamy[2], Moawad I. Dessouky[1], Sami A. El-Dolil[1], and Fathi E. Abd El-Samie[1]

[1]Dept. of Electronics and Electrical Comm., Faculty of Electronic Eng., Menoufia Univ.,32952, Menouf, EGYPT.

[2]Department of Electrical Eng., Faculty of Engineering, Alexandria University, Alexandria 21544, EGYPT.

eng_emadash@yahoo.com, elkhamy@ieee.org, fathi_sayed@yahoo.com

Abstract :

This paper, evaluates the peak-to-average power ratio (PAPR) performance in a space-time block coded (STBC) multi-input multi-output orthogonal frequency-division multiplexing (MIMO-OFDM) system using the selective mapping (SLM) approach. The investigated SLM scheme for MIMO-OFDM signals selects the transmitted sequence with lowest average PAPR over all transmitting antennas

and retrieves the side information (SI) very accurately at the expense of a slight degradation (0.45 dB) of the PAR performance, compared to ordinary SLM approach. The results show that the detection probability of SI bits in the proposed approach improved due to the space time-frequency (STF) diversity effect according to the increase of the number of receiving antennas. Also, we provide closed form of the average BER performance in MIMO-OFDM system using analytic approach.

REFERENCES:

[1] R. V. Nee and R. Prasad, OFDM for Wireless Multimedia Communications, Artech House, 2000.

[2] H. Schulze and C. Luders, Theory and Application of OFDM and CDMA Wideband Wireless communication, John Wiley, 2005.

[3] S. H. Han and J. H. Lee, " A new PTS OFDM scheme with low complexity for PAPR reduction," IEEE Trans. on Broadcasting, vol. 52, pp. 77-82, March, 2006.

[4] S. H. Han and J. H. Lee, " Modified selected mapping technique for PAPR reduction of coded OFDM signal," IEEE Trans. on Broadcasting, vol. 50, pp. 335-341, Sept. 2004.

[5] S. B. Slimane, " Reducing the peake-to-average power ratio of OFDM signals through precoding," IEEE Trans. on Veh. Technol., vol. 56, pp. 686-695, March, 2007.

[6] M. S. Beak, M. J. Kim, Y. H. You, and H. K. Song, " Semi-blind estimation and PAR reduction for MIMO-OFDM system with multiple antennas," IEEE Trans. On Broadcasting, vol. 50, pp. 414-424, Dec. 2004.

[7] R. Prasad, OFDM for wireless Communication Systems, Artech House, 2004.

البحث رقم (4)

Title

A Continuous Phase Modulation Single-Carrier Wireless System With Frequency Domain Equalization

Emad S. Hassan1, Xu Zhu2, Member, IEEE, Said E. El-Khamy3, Fellow, IEEE, Moawad I. Dessouky1, Sami A.
El-Dolil1, Fathi E.Abd El-Samie1

Abstract:

This paper presents a continuous phase modulation (CPM) based single carrier frequency-domain equalization (CPM-SC-FDE) structure for broadband wireless communication systems. The proposed structure combines the advantages of the frequency diversity and low complexity of SC-FDE and the energy efficiency of CPM. Simulation results show that, the proposed CPM-SC-FDE structure provides a better performance than conventional SC-FDE and the CPM based orthogonal frequency division multiplexing (OFDM) systems, by exploiting the channel frequency diversity, efficiently. A properly chosen modulation index can achieve an efficient utilization of the multipath diversity, while maintaining high bandwidth efficiency. The performance analysis of the proposed structure is also presented in the paper.

Index Terms:

Single carrier (SC), Continuous phase modulation (CPM), Frequency domain equalization (FDE), OFDM.

REFERENCES:

[1] D. Falconer, S. Ariyavisitakul, A. Benyamin-Seeyar, and B. Eidson,“Frequency domain equalization for single-carrier broadband wireless systems,” IEEE Commun. Mag., vol. 40, no. 4, April 2002.

[2] A. Gusmo, R. Dinis, and N. Esteves, “On frequency-domain equalization and diversity combining for broadband wireless communications,” IEEE Commun. Lett., vol. 51, no. 7, July 2003.
[3] F. Pancaldi, G. Vitetta, R. Kalbasi, N. Al-Dhahir, M. Uysal, and H. Mheidat, “Single-carrier frequency domain equalization,” IEEE Signal proce. Mag., vol. 25, no. 5, Sept. 2008.
[4] H. Sari, G. Karam, and I. Jeanclaude, “Transmission techniques for digital terrestrial TV broadcasting,” IEEE Commun. Mag., Feb. 1995.
[5] X. Zhu and R. Murch, “Layered space-frequency equalization in a single-carrier MIMO system for frequency-selective channels,” IEEE Trans. on wireless comm., vol. 3, May 2004.
[6] R. V. Nee and R. Prasad, OFDM for wireless multimedia communications. Artech House, 2000.
[7] H. Schulze and C. Luders, Theory and application of OFDM and CDMA wideband wireless communication. John Wiley, 2005.
[8] S. C. Thompson, A. U. Ahmed, J. G. Proakis, and J. R. Zeidler, “Constant envelope OFDM phase modulation: spectral containment, signal space properties and performance,” in IEEE Milcom, vol. 2, Monterey, 2004, pp. 1129–1135.
[9] M. Kiviranta, A. Mammela, D. Cabric, D. A. Sobel, and R. W. Brodersen, “Constant envelope multicarrier modulation: performance evaluation in AWGN and fading channels,” in IEEE Milcom, vol. 2, 2005, pp. 807–813.
[10] S. C. Thompson and A. U. Ahmed, “Constant-envelope OFDM,” IEEE Trans. Commun., vol. 56, no. 8, Aug. 2008.
[11] Y. Tsai, G. Zhang, and J.-L. Pan, “Orthogonal frequency division multiplexing with phase modulation and constant envelope design,” in IEEE Milcom, vol. 4, 2005, pp. 2658–2664.
[12] W. Thillo, F. Horlin, J. Nsenga, V. Ramon, A. Bourdoux, and R. Lauwereins, “Low-complexity linear frequency domain equalization for continuous phase modulation,” IEEE Transactions on Wireless Commun., vol. 8, no. 3, 2009.
[13] F. Pancaldi and G. M. Vitetta, “Equalization algorithms in the frequency domain for continuous phase modulations,” IEEE Transactions on Commun., vol. 54, no. 4, 2006.
[14] E. Hassan, S. El-Khamy, M. Dessouky, S. El-Dolil, and F. A. El-Samie, “New interleaving scheme for CE-OFDM systems using chaotic maps,” in IEEE WOCN, 2009, pp. 1–5.
[15] S. Benedetto, G. Montorsi, A. Perotti, and A. Tarable, “Optimization of CPM pragmatic capacity,” in IEEE GLOBECOM, 2007, pp. 1421–1425.
[16] B. E. Rimoldi, “A decomposition approach to CPM,” IEEE Transactions on Information Theory, vol. 34, March 1988.

[17] J. G. Proakis and D. G. Manolakis, Digital Signal Processing: Principles, Algorithms, and Applications, 3rd ed. NJ: Prentice Hall, 1996.
[18] J. G. Proakis and M. Salehi, Communication Systems Engineering. New Jersey: Prentice Hall, 1994.

Authors Biographies:

Emad S. Hassan received the B.Sc. and M.Sc. degrees in Electrical Engineering from Menoufia University in Egypt in 2003 and 2006, respectively. He is currently an Associate Teacher in the Dept. of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University. In 2008 he joined the Communication Research Group at Liverpool University, Liverpool, UK, as a Visitor Research Student doing research on wireless communication. He is currently working toward the Ph.D. degree in Communication Engineering in the Menoufia University. His areas of interests are CDMA, OFDM, SC-FDE, MIMO, CPM based systems, etc.

Xu Zhu received the B.Eng. degree (with first class honors) from the Huazhong University of Science and Technology, Wuhan, China, in 1999, and the Ph.D. degree from the Hong Kong University of Science and Technology, Hong Kong, in 2003, both in Electrical and Electronic Engineering. Since May 2003, she has been with the Department of Electrical Engineering and Electronics, the University of Liverpool, Liverpool, U.K., where she is currently a lecturer. Dr. Zhu was the vice chair of the 2006 and 2008 ICA

Research Network International Workshops, which were held in Liverpool, U.K. She has served as a session chair and a technical program committee member for various conferences, such as IEEE GLOBECOM 2009 and IEEE VTC Spring-2009. Her research interests include MIMO, OFDM, equalization, blind source separation, cooperative communications and cross-layer optimization, etc.

Said E. El-Khamy received the B.Sc. (Honors) and M.Sc. degrees from Alexandria University, Alexandria, Egypt, in 1965 and 1967 respectively, and the Ph.D. degree from the University of Massachusetts, Amherst, USA, in 1971. He joined the teaching staff of the Department of Electrical Engineering, Faculty of Engineering, Alexandria University, Alexandria, Egypt, since 1972 and was appointed as a Fulltime Professor in 1982 and as the Chairman of the Electrical Engineering Department from September 2000 to September 2003. He is currently an Emeritus Professor. Prof. El-Khamy has published more than three hundreds scientific papers in national and international conferences and journals and took part in the organization of many local and international conferences. His Current research areas of interest include Spread-Spectrum Techniques, Mobile and Personal Communications, Wave Propagation in different media, Smart Antenna Arrays, Space-Time Coding, Modern Signal Processing Techniques and their applications in Image Processing, Communication Systems, Antenna design and Wave Propagation problems. Prof. El-Khamy is a Fellow member of the IEEE since 1999. He received many prestigious national and international prizes and awards including the State Appreciation Award (Al Takderia) of Engineering Sciences for 2004, the IEEE R.W.P. King best paper award of the Antennas and Propagation Society of IEEE, in 1980, the A. Schuman's- Jordan's award for Engineering Research in 1982, and the most cited paper

award from Digital Signal Processing Journal in 2008. He is also a Fellow of the Electromagnetics Academy and a member of Tau Beta Pi, Eta Kappa Nu and Sigma Xi.

Moawad I. Dessouky received the B.Sc. (Hons) and M.Sc. degrees from the Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1976 and 1981, respectively, and the Ph.D. fromMcMaster University, Canada, in 1986. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1986. He has published more than 140 scientific papers in national and international conference proceedings and in journals. He is currently the head of the Dept. Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University. He has received the most cited paper award from Digital Signal Processing Journal in 2008. His current research areas of interest include spectral estimation techniques, image enhancement, image restoration, superresolution reconstruction of images, satellite communications, and spread spectrum techniques.

Sami A. El-Dolil received his B.Sc. and M.Sc. degrees in Electronic Engineering from Menoufia University, Menouf, Egypt, in 1977 and 1981, respectively. In 1986 he joined the Communication Research Group at Southampton University, Southampton, England, as a Research Student doing research on teletraffic analysis for mobile radio communication. He received his Ph.D.

degree from Menoufia University, Menouf, Egypt, in 1989. He was a Post Doctor Research Fellow at the Department of Electronics and Computer Science, University of Southampton, 1991-1993. Since 1994, he is working as an Associate Professor at the Department of Electronics and Electrical Communication, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt. His current research interests are in high-capacity digital mobile system and multimedia networks.

Fathi E. Abd El-Samie received the B.Sc. (Hons), M.Sc., and PhD. from the Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 1998, 2001, and 2005, respectively. He joined the teaching staff of the Department of Electronics and Electrical Communications, Faculty of Electronic Engineering, Menoufia University, Menouf, Egypt, in 2005. He is a co-author of about 70 papers in national and international conference proceedings and in journals. He has received the most cited paper award from Digital Signal Processing Journal in 2008. His current research areas of interest include image enhancement, image restoration, image interpolation, super resolution reconstruction of images, data hiding, multimedia communications, medical image processing, optical signal processing, and spread spectrum communications.

البحث رقم (5)

Puplished In

Academy of Scientific Research and Technology
27th National Radio Science Conference
Faculty of Electronic Engineering, Menoufia Univ., Menouf, Egypt

16-18 March 2010

Title

Peak to Average Power Ratio Reduction for OFDM Signals with Unequal Power Distribution Strategy and The Selective Mapping Technique

Emad S. Hassan[1], Said E. El-Khamy[2], Moawad I. Dessouky[1], Sami A. El-Dolil[1], and Fathi E. Abd El- Samie[1]
[1]Deptartment of Electronics and Electrical Communications, Faculty of Electronic Engineering,
Menoufia University, 32952, Menouf, Egypt.
[2]Department of Electrical Engineering, Faculty of Engineering, Alexandria University, Alexandria
21544, Egypt.
E-mails: eng_emadash@yahoo.com, elkhamy@ieee.org, fathi_sayed@yahoo.com.

Abstract:

In this paper, we present a new approach for peak to average power ratio (PAPR) reduction in orthogonal frequency division multiplexing (OFDM) signals. This approach is based on assigning powers to the different subcarriers of OFDM using an unequal power distribution strategy and then using the selective mapping (SLM) technique. The effect of the nonlinear power amplifier (PA) on the performance of the OFDM system is studied. Expressions are derived for the distributions of the PAPR in the cases of equal and unequal power distribution strategies. The amount of power saving resulting from using the SLM technique with the unequal power distribution strategy is estimated.

Index Terms:

OFDM, PAPR, SLM, and PA.

References:

[1] R. V. Nee and R. Prasad, OFDM for Wireless Multimedia Communications, Artech House, 2000.

[2] H. Schulze and C. Luders, Theory and Application of OFDM and CDMA Wideband Wireless communication, John Wiley, 2005.
[3] E.S. Hassan, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "Peak-toaverage power ratio reduction in space–time block coded multi-input multi-output orthogonal frequency division multiplexing systems using a small overhead selective mapping scheme ", IET Commun., vol. 3, no. 10, pp. 1667-1674, 2009.
[4] S. Han and J. Lee, "An overview of peak-to-average power ratio reduction techniques for multicarrier transmission," IEEE Trans. Wireless Commun., vol. 12, pp. 56–65, Apr. 2005.
[5] S. B. Slimane, "Reducing the peak-to-average power ratio of OFDM signals through
precoding," IEEE Trans. on Veh. Techn., vol. 56, pp. 686-695, March, 2007.
[6] Y. Lee, Y. You, W. Jeon, J. Paik, and H. Song, "Peak-to-average power ratio in MIMO-OFDM systems using selective mapping," IEEE Comm. Letters, vol. 7, pp. 575–577, Dec. 2003.
[7] H. Chen, and H. Liang, "Combined selective mapping and binary cyclic codes for PAPR
reduction in OFDM systems," IEEE Trans. on Wireless Comm., vol. 6, pp. 3524-3528, Oct.
2007.
[8] F. Kohandani and A. Khandani, "A new algorithm for peak/average power reduction in OFDM systems," IEEE Trans. on Brodcasting, vol. 54, pp. 159-165, March 2008.
[9] E.S. Hassan, S.E. El-Khamy, M.I. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "A simple selective mapping algorithm for the peak to average power ratio in space time block coded MIMO-OFDM systems," in proc. HPCNCS-08, Orlando, FL, USA, pp. 103-106, July 2008.
[10] H. Ochiai and H. Hideki, "On the distribution of the peak-to-average power ratio in OFDM signals," IEEE Trans. on comm., vol. 49, pp. 282-289, Feb. 2001.
[11] R. Prasad, OFDM for wireless Communication Systems, Artech House, 2004.
[12] S. H. Han and J. H. Lee, "Modified selected mapping technique for PAPR reduction for OFDM systems based on extreme value theory," IEEE Trans. on Broadcasting, vol. 50, pp. 335-341, Sept. 2004.
[13] T. Jiang, M. Guizani, H. Chen, W. Xiang, and Y. Wu, "Derivation of PAPR distribution of the peak-to-average power ratio in OFDM signals," IEEE Trans. on wireless comm., vol. 7, pp. 1298-1305, April 2008.

[14] R. Baxley and T. Zhou, “Power savings analysis of peak-to-average power ratio reduction in OFDM,” IEEE Trans. on Consumer Elect., vol. 50, pp. 792-797, Aug. 2004.
[15] A. A. M. Saleh, “Frequency-Independent and Frequency-Dependent Nonlinear Models of TWT Amplifiers,” IEEE Trans. Commun., vol. 29, pp. 1715-1720, Nov. 1981.
[16] H. G. Ryu, T. P. Hoa, K. M. Lee, S. W. Kim, and J. S. Park, “Improvement of power efficiency of HPA by the PAPR reduction and predistortion” IEEE Trans. Consumer Electronic, vol. 50, pp. 119-124, Feb. 2004.

البحث رقم (6)

Puplished In

26th NATIONAL RADIO SCIENCE CONFERENCE (NRSC2009)
March 17-19,2009, Faculty of Engineering, Future Univ., Egypt

Title

Enhanced Performance of OFDM and Single-Carrier Systems Using Frequency Domain Equalization and Phase Modulation

Emad S. Hassan', Xu Zhu2, Said E. EI-Khamy3, Moawad I. Dcssouky', Sami A. EI-Dolil1, and Fathi E. Abd EI-Samie1
1Dept. ofElectronics and Electrical Comm., Faculty ofElectronic Eng., Menoufia Univ.,32952, Menouf,
EGYPT.
2Dept. ofElectrical Eng. And Electronic, Liverpool University, L69 3GJ, UK.
3Department ofElectrical Eng., Faculty ofEngineering, Alexandria University, Alexandria 21544, EGYPT.
eng_emadash@yahoo.com, xuzhu@liverpool.ac. uk,
elkhamy@ieee. org, fathi_sayed@yahoo.com.

Abstract:

Phase modulation based systems have the advantages of constant envelope (CE) signals and the ability to improve the diversity of multipath channels. In this paper, we study the performance of single-carrier (SC) and orthogonal frequency-division multiplexing (OFDM) systems using phase modulation (PM). Both systems are implemented with frequency domain equalization (FDE) to obtain high diversity gains over the frequency selective multipath fading channels. FDE performance using both zero forcing (ZF) and minimum mean square error (MMSE) is studied over a wide range of multipath fading channel models. Simulation results show that, the PM based systems performance with multipath fading can outperform their performance with single path fading. The performance over the multipath channels is at least 5 dB and 12 dB better than the performance over the single path channel, using PM based OFDM and SC-FDE systems, respectively. The results also show that, when PM is utilized, SC-FDE systems can outperform OFDM systems by about 5 dB.

Index Terms:

Frequency domain equalization (FDE), OFDM, Phase modulation (PM), Performance analysis.

References:

[I] R. V. Nee and R. Prasad, OFDM for Wireless Multimedia Communications, Artech House, 2000.

[2] H. Schulze and C. Luders, Theory and Application of OFDM and CDMA Wideband Wireless communication, John Wiley, 2005.

[3] P. Banelli, "Theoretical analysis and performance of OFDM signals in nonlinear fading channels ," IEEE Trans . Wireless Commun. , vol. 2, no. 2, pp. 284-293, Mar. 2003.

[4] D. Dardari, V. Tralli, and A. Vaccari, "A theoretical characterization of nonlinear distortion effects in OFDM systems," IEEE Trans. Commun., vol. 48, no. 10, pp. 1755-1764, Oct. 2000.

[5] P. Banelli, G. Baruffa, and S. Cacopardi, "Effects of HPA non linearity on frequency multiplexed OFDM signals," IEEE Trans. Broadcast., vol. 47, no. 2, pp. 123-136, June 2001.

[6] S. Han and J. Lee, "An overview of peak-to-average power ratio reduction techniques for multicarrier transmission," IEEE Trans. Wireless Commun., vol. 12, pp. 56-65, Apr. 2005.

[7] Y. Lee, Y. You, W. Jeon, J. Paik, and H. Song, "Peak-to-average power ratio in MIMO-OFDM systems using selective mapping," IEEE Comm. Letters, vol. 7, pp. 575-577, Dec. 2003.

[8] M. S. Beak, M. J. Kim, Y. H. You, and H. K. Song, " Semi-blind estimation and PAR reduction for MIMOOFDM system with multiple antennas," IEEE Trans. on Broadcasting, vol. 50, pp. 414-424, Dec. 2004.

[9] H. Chen, and H. Liang, " Combined selective mapping and binary cyclic codes for PAPR reduction in OFDM systems," IEEE Trans. on wireless comm., vol. 6, pp. 3524-3528, Oct. 2007.

[10] E.S. Hassan, S.E. El-Khamy, M.1. Dessouky, S.A. El-Dolil, F.E. Abd El-Samie, "A simple selective mapping algorithm for the peak to average power ratio in space time block coded MIMO-OFDM systems," in proc. HPCNCS-08, Orlando, FL, USA, pp. 103-106, July 2008.

[11] S. C. Thompson, A. U. Ahmed, J. G. Proakis, and J. R. Zeidler, "Constant Envelope OFDM Phase Modulation: Spectral Containment, Signal Space Properties and Performance," in Proc. IEEE Milcom, vol. 2, Monterey, pp. 1129-1135, Oct. 2004.

[12] M. Kiviranta, A. Mammela, D. Cabric, D. A. Sobel, and R. W. Brodersen, "Constant Envelope Multicarrier Modulation: Performance Evaluation In AWGN and Fading Channels," in Proc. IEEE Milcom, vol. 2, pp. 807-813, Oct. 2005.

[13] Y. Tsai, G. Zhang, and J.-L. Pan, "Orthogonal Frequency Division Multiplexing with Phase Modulation and Constant Envelope Design," in Proc. IEEE Milcom, vol. 4, pp. 2658-2664, Oct. 2005
[14] S. C. Thompson, A. U. Ahmed, "Constant-Envelope OFDM," IEEE Trans. On Commun. Vol. 56, pp. 13001312, Aug. 2008.
[15] D. Falconer, S.L. Ariyavisitakul, A. Benyamin-Seeyar, and B. Eidson, "Frequency domain equalization for single-carrier broadband wireless systems," IEEE Commun. Mag., vol. 40, no. 4, pp. 58-66, Apr. 2002.
[16] A. Gusmao, R. Dinis, and N. Esteves, "On frequency-domain equalization and diversity combining for broadband wireless communications," IEEE Commun. Lett., vol. 51, no. 7, pp. 1029-1033, July 2003.
[17] F. Pancaldi, G.M. Vitetta, R. Kalbasi, N. Al-Dhahir, M. Uysal, and H. Mheidat, " Single-carrier frequency domain equalization," IEEE Signal proce. Mag., vol. 25, no. 5, pp. 37-56, Sept. 2008.
[18] H. Sari, G. Karam, and I. Jeanclaude, "Transmission techniques for digital terrestrial TV broadcasting," IEEE Commun. Mag., pp. 100-109, Feb. 1995.
[19] Y. Liu and Y. Du, "A new coding scheme in SC-FDE," in Proc. IEEE Wicom, pp. 1-4, Sept. 2006.
[20] J. Li, Y Du, and Y. Liu, "Comparison of spectral efficiency for OFDM and SC-FDE under IEEE 802.16 Scenario," in Proc. IEEE ISCC'06, pp. 467-471, June 2006.
[21] Y. Wang, X. Dong, P. Wittke, and M. Shaomin, "Cyclic prefixed single carrier transmission in ultrawidebandcommunications, " IEEE Trans. on wireless comm., vol. 5, pp. 2017-2021, Aug. 2006.

البحث رقم (7)

Title

New Interleaving Scheme for CE-OFDM Systems U sing Chaotic Maps

Emad s. Hassant , Said E. EI-Khamy+, Fellow, IEEE, Moawad 1. Dessoukyt, Sami EI-Dolilt, Fathi E. Abd EI-Samiet .
tDept. of Electronics and Electrical Comm., Faculty of Electronic Eng., Menoufia University, 32952, EGYPT.
+Dept. of Electrical Eng., Faculty of Engineering, Alexandria University, Alexandria, 21544, EGYPT.

Abstract:

Continuous phase modulation (CPM) is an attractive scheme for wireless communications because of its constant envelope (CE) and its ability to improve the diversity of the multipath channel. In this paper we propose a new interleaving scheme for the CPM based orthogonal frequency·division multiplexing (CE·OFDM) system, namely chaotic interleaving. The proposed

system combines the key characteristics of CE·OFDM and the chaotic maps. Thus, this new system gets the advantages of power efficiency of CE·OFDM and the performance improvement of the chaotic interleaving. The proposed system comprises frequency domain equalization (FDE) to obtain high diversity gains over frequency selective multi path fading channels. The bit error rate (BER) performance of the CE·OFDM system with and without chaotic interleaving is evaluated by computer simulations. The simulation results show that, the CE·OFDM system based on the new interleaving scheme provides a better performance of about 2.3 dB improvements in SNR than the conventional CE·OFDM system.

Index Terms:

Continuous phase modulation (CPM), OFDM, Frequency domain equalization (FDE), Chaotic Maps, Perfor· mance analysis.

REFERENCES:

[l] R. V. Nee and Prasad, OFDM for wireless multimedia communications. Artech House, 2000.
[2] H. Schulze and C. Luders, Theory and application ofOFDM and CDMA wideband wireless communication. John Wiley, 2005.
[3] P. Banelli, "Theoretical analysis and performance of ofdm signals in nonlinear fading channels," IEEE Trans. Wireless Commun., vol. 2, no. 2, March 2003.
[4] P. Banelli, G. Baruffa, and S. Cacopardi, "Effects ofhpa non linearity on frequency multiplexed ofdm signals," IEEE Trans. Broadcast., vol. 47, no. 2, June 2001.
[5] S. Han and J. Lee, "An overview of peak-to-average power ratio reduction techniques for multicarrier transmission," IEEE Trans. Wireless Commun., vol. 12, April 2005.
[6] Lee, You, W. Jeon, 1. Paik, and H. Song, "Peak-to-average power ratio in mimo-ofdm systems using selective mapping," IEEE Comm. Letters, vol. 7, April 2003.
[7] Chen and H. Liang, "Combined selective mapping and binary cyclic codes for papr reduction in ofdm systems," IEEE Trans. on wireless comm., vol. 6, Oct. 2007.

[8] E. Hassan, S. EI-Khamy, M. Dessouky, S. EI-Dolil, and A. EI-Samie, "A simple selective mapping algorithm for the peak to average power ratio in space time block coded mimo-ofdm systems," in HPCNCS-08, Orlando, FL, USA, 2008, pp. 103-106.
[9] S. C. Thompson, A. U. Ahmed, J. G. Proakis, and J. R. Zeidler, "Constant envelope ofdm phase modulation: spectral containment, signal space properties and performance," in IEEE Milcom, vol. 2, Monterey, 2004, pp. 1129-1135.
[10] M. Kiviranta, A. Mammela, D. Cabric, D. A. Sobel, and R. W. Brodersen, "Constant envelope multicarrier modulation: performance evaluation in awgn and fading channels," in IEEE Milcom, vol. 2, 2005, pp. 807-813.
[II] Tsai, G. Zhang, and J.-L. Pan, "Orthogonal frequency division multiplexing with phase modulation and constant envelope design," in IEEE Milcom, vol. 4, 2005, pp. 2658-2664.
[12] S. C. Thompson and A. U. Ahmed, "Constant-envelope ofdm," IEEE Trans. On Commun., vol. 56, no. 8, Aug. 2008.
[13] S. C. Thompson, J. G. Proakis, J. R. Zeidler, and M. Geile, "Constantenvelope ofdm in multi path rayleigh fading channels," in IEEE Milcom, 2006, pp. 1-7.
[14] S. Benedetto, G. Montorsi, A. Perotti, and A. Tarable, "Optimization of cpm pragmatic capacity," in IEEE GLOBECOM, 2007, pp. 1421-1425.
[15] Matthews, "On the derivation of a chaotic encryption algorithm," Cryptologia XIII, vol. 1, 1989.
[16] S. Deffeyes, "Encryption system and method," US Patent, no. 5001754, March 1991.
[17] 1. Fridrich, "Symmetric ciphers based on two-dimensional chaotic maps," Int. Journal of Bifurcation and Chaos, vol. 8, Oct. 1998.
[18] J. G. Proakis and D. G. Manolakis, Digital Signal Processing: Principles, Algorithms, and Applications, 3rd ed. Upper Saddle River, NJ: Prentice Hall, 1996.
[19] J. G. Proakis and M. Salehi, Communication Systems Engineering. New Jersey: Prentice Hall, 1994.