
Editorial

Fatos Xhafa*

Department de Llenguatges i Sistemes Informàtics,
 Universitat Politècnica de Catalunya,
 Campus Nord, Ed Omega,
 C/Jordi Girona, 1-3 08034 Barcelona, Spain
 E-mail: fatos@lsi.upc.edu
 *Corresponding author

Xiaofeng Chen

School of Telecommunications Engineering,
 Xidian University,
 Taibai South Road 2#, Xi'an City,
 Shaanxi Province, Postcode: 710071, China
 E-mail: xfchen@xidian.edu.cn

Biographical notes: Fatos Xhafa received his PhD in Computer Science from the Department of Languages and Informatics Systems (LSI) of the Technical University of Catalonia (UPC), Barcelona, Spain. He was a Visiting Professor at the Department of Computer Science and Information Systems, Birkbeck, University of London (UK) during academic year 2009 to 2010 and a Research Associate at the College of Information Science and Technology, Drexel University, Philadelphia, USA during academic year 2004/2005. He has widely published in peer reviewed international journals, conferences/workshops, book chapters and edited books and proceedings in the field. He has an extensive editorial and reviewing service as an Editor-in-Chief and Associate Editor/Editor of several international scientific journals and Guest Editor of many special issues of international journals. He is actively participating in the organisation of several international conferences. His research interests include parallel and distributed algorithms, combinatorial optimisation, approximation and meta-heuristics, networking and distributed computing.

Xiaofeng Chen received his PhD in Cryptography from the Xidian University in 2003. He is currently a Professor at the School of Telecommunications Engineering, Xidian University. He has widely published in peer reviewed international journals, conferences/workshops, book chapters and edited books and proceedings in the field. He is actively participating in the organisation of several international conferences. His research interests include public key cryptography, financial cryptography and cloud computing security.

With the rapid development of wireless services and new multimedia applications in the era of big data, there is an ever increasing demand of the transmission capacity, reliability, and coverage extension in the wireless networks. Several key enabling technologies, such as cognitive radio and cooperative communications, have been developed to deal with these challenges. Cognitive radio has the potential of dealing with the stringent requirement and scarcity of the radio spectrum and promoting efficient spectrum utilisation, while cooperative communication allows distributed terminals in a wireless network to collaborate through some distributed transmission or signal processing to realise a new form of space diversity, i.e., cooperative diversity. However, the emergence of new wireless system architectures and the incorporation with other advanced technologies, such as MIMO, OFDM and network coding, have posed new design challenges in the wireless communication field.

To fully enhance the spectral efficiency and spectrum utilisation and to further achieve the possible cooperative diversity in future wireless networks, spectrum sensing and detection, distributed resource allocation, cooperative strategy design, etc., deserve to attract more attentions from academia and industry.

This special issue on 'Cognitive and cooperative communications for wireless networks' attempts to highlight some of the latest research addressing those challenges. It consists of nine papers selected from the contributions of the 4th International Conference on Intelligent Networking and Collaborative Systems (INCoS 2012). More specifically:

- Yang, Sheng, Li, Li and Li's paper (Yang et al., 2013a) on 'Energy-aware joint power and rate control in overlay cognitive radio networks: a Nash bargaining perspective' presents a general cooperative game-theoretical scheme (the asymmetric and

symmetric bargaining cases) for minimising the ‘energy-per-bit’ utility function designed in a green cognitive radio network, which can achieve the optimal performance tradeoff between individual fairness and network energy efficiency.

- The paper of Ji, Zhang, Zhang and Huang titled ‘Outage-optimal power allocation for space-time cooperative network coding with amplify-and-forward protocol’ (Ji et al., 2013), proposes an optimal power allocation (OPA) algorithm for a space-time cooperative network coding scheme employing amplify-and-forward protocol. The proposed algorithm only needs the average channel gain information and has low computation complexity, which facilitates the practical implementation.
- Yang, Zhang and Ji’s paper (Yang et al., 2013b) on ‘Impartial spectrum decision under interference temperature model in cognitive wireless mesh networks’ proposes a new metric for the spectrum handoff decision in cognitive wireless mesh networks to increase the spectrum efficiency and decrease the handoff latency, and further applies it to the probability-based spectrum decision scheme. The proposed scheme improves the total system performance and guarantees the fairness of the channel utilisation.
- The paper of Wei, Rui, Luo, Li, Wang and Wang titled ‘Cooperative transmission with broadcasting and communication’ (Wei et al., 2013), proposes a novel cooperative transmission strategy with broadcasting and cellular communication in a hybrid network system. The cooperative diversity transmission (CDT) is deployed for the user at the edge of the broadcast cell while the cooperative multiplexing transmission (CMT) is exploited for the user near the broadcasting base station. Simulation results reveal that CDT can improve BER performance while CMT can improve throughput performance.
- Shi, Ge, Li and Ji’s paper (Shi et al., 2013) on ‘Network-coding-based hybrid-ARQ for BI-directional regenerative relaying’ presents a novel network-coding-based hybrid automatic retransmission request scheme for two-way relaying system. The proposed scheme can retransmit more information in a given time interval by introducing network coding in the retransmission, and thus improves the system throughput. Compared to the traditional HARQ scheme in two-way relaying system, significant throughput gain can be achieved.
- The paper of Sun, Ge, Li, Shi and Bao titled ‘Linear precoding design for cognitive multiuser MIMO systems using a leakage-based approach’ (Sun et al., 2013), proposes a new linear precoding scheme for the cognitive radio MU-MIMO downlink systems, which employs block diagonalisation (BD) algorithm and a matching weighted SLNR

maximisation algorithm. The proposed scheme not only relaxes the constraint on the number of transmit and receive antennas, but also greatly improves the sum rate with affordable complexity.

- Zhu, Ge, Li, Shi and Huang’s paper (Zhu et al., 2013) on ‘Interference alignment for MIMO cognitive networks: a complex FDP-based subspace tracking approach’ presents a practical interference alignment (IA) algorithm for MIMO cognitive networks by using a subspace tracking approach based on the complex fast data projection method (FDP). To eliminate interference among secondary users, the proposed algorithm alternately designs the precoding and postprocessing matrices through a complex FDP-based training period without any channel knowledge of secondary networks.
- The paper of Wang, Yang, Ai, Li, Zhang and Li titled ‘Interference management strategy for multiuser two-way relay networks’ (Wang et al., 2013), proposes new constructions of the tradeoff between the efficiency and reliability in a multiuser two-way transmission network where multiple pairs of users communicate with their pre-assigned partners. The proposed scheme takes advantage of the signal space alignment technique to cancel the multi-user interference while all users can transmit messages to the relay simultaneously over the same channel resource.
- The paper of Zhang, Mao and Xu titled ‘On the security of an ID-based anonymous proxy signature scheme and its improved scheme’ (Zhang et al., 2013), shows that Hu et al.’s anonymous proxy signature is universally forgeable, and the original signer can not also trace the actual identity of proxy signer. To overcome the above attacks, they propose an improved anonymous proxy scheme based on bilinear map of composite order, and the scheme achieves unforgeability and anonymity.

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References

- Ji, Y., Zhang, G., Zhang, X. and Huang, X. (2013) ‘Outage-optimal power allocation for space-time cooperative network coding with amplify-and-forward protocol’, *International Journal of Embedded Systems*, this issue.
- Shi, X., Ge, J., Li, J. and Ji, Y. (2013) ‘Network-coding-based hybrid-ARQ for bi-directional regenerative relaying’, *International Journal of Embedded Systems*, this issue.
- Sun, C., Ge, J., Li, J., Shi, X. and Bao, X. (2013) Linear precoding design for cognitive multiuser MIMO systems using a leakage-based approach, *International Journal of Embedded Systems*, this issue.

- Wang, Y., Yang, L., Ai, Y., Li, H., Zhang, Y. and Li, F. (2013) 'Interference management strategy for multiuser two-way relay networks', *International Journal of Embedded Systems*, this issue.
- Wei, D., Rui, Y., Luo, Y., Li, M., Wang, F. and Wang, Y. (2013) 'Cooperative transmission with broadcasting and communication', *International Journal of Embedded Systems*, this issue.
- Yang, C., Sheng, M., Li, J., Li, H. and Li, J. (2013a) 'Energy-aware joint power and rate control in overlay cognitive radio networks: a Nash bargaining perspective', *International Journal of Embedded Systems*, this issue.
- Yang, Y., Zhang, G. and Ji, Y. (2013b) 'Impartial spectrum decision under interference temperature model in cognitive wireless mesh networks', *International Journal of Embedded Systems*, this issue.
- Zhang, J., Mao, J. and Xu, Y. (2013) 'On the security of an ID-based anonymous proxy signature scheme and its improved scheme', *International Journal of Embedded Systems*, this issue.
- Zhu, B., Ge, J., Li, J., Shi, X. and Huang, Y. (2013) 'Interference alignment for MIMO cognitive networks: a complex FDPM-based subspace tracking approach', *International Journal of Embedded Systems*, this issue.