Advances in Wireless Communications and Networks

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This special issue features five selected papers with high quality from the conference Chinacom 2009, which was held in Xi'an, China, August 26–28, 2009. This first article, “DFMAC: DTN-Friendly Medium Access Control for Wireless Local Area Networks Supporting Voice/Data Services”, co-authored by Hao Liang and Weihua Zhuang, considers a heterogeneous network where local nodes reside in densely populated hot spots while nomadic nodes roam in a large area. Wireless local area networks (WLANs) are deployed in the hot spots, while a delay/disruption tolerant network (DTN) provides services to nomadic nodes. In order to achieve efficient resource allocation for the DTN/WLAN integrated network, a DTN-friendly medium access control (DFMAC) scheme is proposed for the hot spots supporting voice/data services. Based on a superframe structure and token passing mechanisms, deterministic packet delay can be guaranteed for the voice services of local nodes, and a good tradeoff can be achieved for the data services between nomadic nodes and local nodes. Analytical and simulation results are

presented to demonstrate the performance of the proposed DFMAC scheme.

The second article titled “Sidelobe Suppression Using Extended Active Interference Cancellation with Self-Interferences Constraint for Cognitive OFDM Systems” from Zhiqiang Wang, Daiming Qu, Tao Jiang and Mahmoud Daneshmand, takes the theoretical analysis of the interference cancellation to the next level, showing that a good sidelobe suppression performance of about 38.0 dB with signal-to-noise ratio loss less than 0.10 dB at symbol-error-rate of 10^{-3} when 64QAM modulation is employed, a critical aspect of cognitive OFDM systems, mathematically characterizing these features of prototypical OFDM waveforms.

The next article investigates Attribute-Based Encryption (ABE). The authors (Jin Li, Qian Wang, Cong Wang and Kui Ren) proposed a new technique on how to improve the efficiency of Attribute-ABE by utilizing the often-found hierarchy relationships among the attributes that are inherent in many access control scenarios. As the first research effort along this direction, we coined the notion of hierarchical ABE (HABE), which can be viewed as the generalization of traditional ABE in the sense that both definitions are equal when all attributes are independent. We further gave a concrete HABE construction considering a tree hierarchy among the attributes. The construction can be proven secure under standard assumption. More importantly, our construction can exhibit significant improvement over the traditional ABE when attribute hierarchies exist.

The fourth article, “Joint optimization of source power allocation and relay beamforming in multiuser cooperative

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wireless networks,” from Xin Li, Yimin D. Zhang and Moeness G. Amin, discusses the maximization of sum capacity in multiuser cooperative wireless networks consisting of single-antenna nodes, in which multiple concurrent source-destination links are relayed by a number of cooperative nodes. It is demonstrated that joint optimization of source power allocation and relay beamforming is important to enable significant sum capacity increment over TDMA, source selection, and equal-power spatial multiplexing schemes. The optimization of global sum capacity subject to individual capacity requirements is also considered to meet the needs of delivering data from each source node.

In this last article with the title “A-ADHOC: An Adaptive Real-time Distributed MAC Protocol for Vehicular Ad Hoc Networks”, the authors (Jia Liu, Fengyuan Ren, Limin Miao and Chuang Lin) proposed an adaptive MAC protocol for Vehicular Ad Hoc Networks, referred to as A-ADHOC. The authored first pointed out that two major shortcomings of an existing MAC protocol, ADHOC, are its efficiency and reliability due to its fixed length of frames. A-ADHOC, with the adaptability of frame length, has improved the ADHOC in both channel resource utilization and response time. Through carefully devised frame adjusting rules, A-ADHOC not only lowers the response time by 50% over the original ADHOC protocol but improves the throughput greatly of the whole networks. Moreover, implementing mechanism of A-ADHOC substantially alleviates network failure when increasing dense of nodes, which is an inherent problem of ADHOC protocol.

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