Editorial: Multimedia Transmission and Process in Heterogeneous Network

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Editorial:

With the explosive growth of wireless and wire technologies, communication networks are essentially becoming heterogeneous. The media at the physical layer are heterogeneous, e.g. optical fiber and radio media are exploited for achieving the communication. Similarly, the technologies used in access networks are also heterogeneous, and some example access technologies are PON (Passive Optical Network), IEEE802.15, IEEE802.11, WiMax. The performances of the multimedia services offered over the heterogeneous communication networks can possibly be affected by such heterogeneity. The delay and jitter can vary greatly when multimedia data travel through different physical media, leading to a demand for different transmission rate and resource allocation methods. As a result, resource management faces a great number of challenges. Moreover, the malicious and selfish nodes may also behave differently in heterogeneous networks. Therefore, the detection methods and trustable data transmission schemes should be designed to meet the specific constraints in each domain. In addition, there is a need for cooperative caching, energy efficient, data analysis, data fusion and other technologies to evolve.

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This special issue features six high-quality selected papers. The first article, “Cooperative Game-Based Cheating in Full-Duplex Relaying-Based D2D Communication Underlying Heterogeneous Cellular Networks”, authored by Bowen Wang et al., proposed a full-duplex relaying-based D2D communication scheme in multi-user heterogeneous cellular network to improve the spectrum resource utilization. To improve the throughput of D2D users, The Gale-Shapley algorithm is utilized to find a stable matching in the resource allocation problem. Furthermore, a cooperative game algorithm is presented in order to further improve some D2D users’ throughput.

The second article titled “Allocating Multi-type Resources in Heterogeneous Cloud Radio Access Networks” presented the motivation for introducing the collaborative signal processing and cooperative radio resource allocation in heterogeneous cloud radio access network (H-CRAN) and designed a cross-layer resource allocation framework for the H-CRAN. Then a multi-type resource allocation algorithm called heterogeneous weighted dominant resource fairness (H-WDRF) is presented based on the proposed framework. In H-WDRF, the transmission power allocation problem is designed as a coordinated beamforming problem with several non-convex constraints and iteratively solved by second order cone programming (SOCP). To implement the algorithm in the running task system, an aggressive filling algorithm is also proposed in this article.

In the next article with the title “Building and Climbing based Visual Navigation Framework for Self-Driving Cars”, the authors studied a visual navigation strategy for self-driving car running on a constant-width road. To achieve effective visual navigation, a novel building and climbing visual navigation (BCVN) framework that decomposes the visual navigation task into three subtasks: navigation line extraction, deviation calculation, and curvature calculation is designed in this article. Finally, the least squares algorithm is utilized for real-time implementation of the BCVN framework.

D2D communications is widely regarded as one of the most promising technologies for future mobile communications. The fourth article titled “Social-aware D2D pairing for cooperative video transmission using matching theory” proposed a cooperative D2D communication model for video transmission, which exploits the social relationships and physical conditions between users to analyze the user’s willingness to cooperate and the quality of the channel. The economic two-sided matching theory is employed to transfer cooperative video transmission problem to dynamic and mutually beneficial relations among different types of rational and selfish agents.

Cloud services facilitate multimedia data distribution and dissemination in heterogeneous network. Efficient storage and management expenditure reduced for the huge amount of multimedia data is a critical challenge for the cloud service providers in heterogeneous networks. The fifth article, “RSE-PoW: A role symmetric encryption PoW scheme with authorized deduplication for multimedia data” proposed novel role symmetric encryption proof of ownership (RSE-PoW) scheme for secure multimedia deduplication in heterogeneous environments.

The last article titled “Video service recovery mechanism based on quality of experience-aware in hybrid wireless-optical broadband-access network” investigated a video recovery mechanism based on quality of experience (QoE), which aims to evaluate the quality of video service and recover the unacceptable video service in hybrid wireless-optical broadband-access network (WOBAN). The QoE evaluation model is presented on the basis of the QoS parameters. Furthermore, the least weight matching is employed to search the alternate routing of the unacceptable video service.

Dapeng Wu is currently a professor at the Chongqing University of Posts and Telecommunications, Chongqing, China. He authored more than 100 publications and two books. He is the inventor and co-inventor of 28 patents and patent applications. His research interests are in social computing, wireless networks, and big data. Prof. Wu serves as TPC Chair of 10th Mobimedia and program committee member for numerous international conferences and workshops. He served or is serving

as an Editor or/and Guest Editor for several technical journals, such as Elsevier Digital Communications and Networks, ACM/Springer Mobile Network and Applications. He is a senior member of the IEEE.

Honggang Wang worked for Bell Labs Lucent Technologies China from 2001 to 2004 as a member of technical staff. He received his Ph.D. in computer engineering from the University of Nebraska-Lincoln in 2009. He is an assistant professor at the University of Massachusetts (UMass) Dartmouth and is an affiliated faculty member with the Advanced Telecommunications Engineering Laboratory at the University of Nebraska-Lincoln. He is also a faculty

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