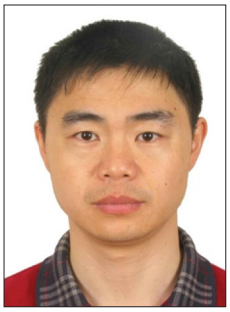
SOFTWARE DEFINED WIRELESS NETWORKS (SDWN): PART 1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The growing popularity of smart phones, tablet computers and mobile cloud services places an increasing demand for dynamic services from wireless networks. This demand creates new requirements for the network architecture, such as flexibility in management and configuration, adaptability and vendor-independence. To meet these requirements, software defined wireless network (SDWN) has been proposed as a cost-effective solution. SDWN decouples the data plane from the control plane, enabling direct programmability of network controls and an abstraction of the underlying infrastructure for wireless applications. With SDWN, we can create a service delivery platform that is adaptable to the users' varying demands. However, issues such as supporting a large number of subscribers, frequent mobility, fine-grained measurement and control, and real-time adaptation need to be addressed by future SDWN architectures. In this Feature Topic, we provide an overview of the latest major developments and progresses in SDWN.

The first article, "Network Virtualization and Resource Description in Software-defined Wireless Networks" by Zhou *et al.*, focuses on the state-of-the-art SDWN architecture, including control plan virtualization strategies as well as semantic ontology for network resource description. The key technology to implement network resource description, semantic web technology, has been introduced in detail along with its three key elements including metadata, ontology and Resource Description Framework (RDF).

Inspired by an information centric view, in the second article, "When ICN Meets C-RAN for HetNets: An SDN Approach," Yang *et al.* realize that the rapid increase of network traffic and the change of the communication mode in the HetNet require a new wireless architecture for easier, flexible and reconfigurable infrastructure deployment and network management. As such, the authors propose an information-centric software defined networking (SDN) and Cloud Radio Access Network (C-RAN) architecture consisting of three planes, named application, control and forwarding, respectively. The vision of the proposed system is demonstrated, followed by an analysis of advantages and challenges. The authors also use a large-scale wireless heterogeneous campus network as an example to demonstrate the outstanding performance on network throughput and traffic offloading of the proposed architecture.

The software oriented design in mobile networks will be fundamentally different from SDN for Internet. Mobile networks predominantly have to care on the wireless access problem in complex radio environments, while the Internet needs to handle the packet forwarding problem. With this key differentiation in sight, the third article, "Software Defined Mobile Networks: Concept, Survey and Research Directions" by Chen *et al.*, presents the needs and requirements of SDWN, with the focus on the software-defined design for radio access networks (RAN). The article analyzes the fundamental problems in RAN which require novel SDN design approaches. They identify several areas for SDN on RAN which largely remain as open research topics.

The flexibility introduced with the SDWN architecture provides many opportunities for novel resource management concepts and methodologies. The fourth article, "Service Providers Competition and Cooperation in Cloud-based Software Defined Wireless Networks" by Ding *et al.*, is dedicated to the resource management problem in cloud-based SDWN. It explores the benefits and disadvantages of cooperation and competition between cloud service providers (CSPs). Through analyses and benchmarks the authors advocate cooperation and resource sharing among CSPs which has great significance in efficiently utilizing constraint resources at a high level of Quality-of-Service.

The fifth article, "An Intelligent SDN Framework for 5G Heterogeneous Networks" by Sun *et al.*, proposes an SDN based intelligent model to efficiently manage the het-

erogeneous infrastructure and resources under dynamic demands. The paper first reviews the latest SDN standard progresses and then discusses possible extensions. It proposes a number of SDN based schemes for different application scenarios to improve traffic control, subscriber management and resource allocation. The authors also present performance analysis of the proposed schemes.

The five articles included in this issue cover a wide variety of SDWN-related topics from candidate architectures to technological enablers for future SDWN. We believe that these articles will give an overall direction for those interested in this topic.

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