

# Mobile and Wireless Computing towards Sustainable and Ubiquitous Clouds Services

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## ABSTRACT

*The ever-growing cloud computing and services provide dynamic intelligence and play an increasingly critical role in all aspects of our lives. By taking advantage of virtualized resources, cloud computing services presents an attractive means to address the challenges while realizing the potential of Mobile and Wireless Computing (MWC). The MWC paradigm can be generalized to include mobile devices, which not only incorporate sophisticated methods for users to interact with the online world through numerous applications in their devices, but are endowed with multiple sensors that enable them to contribute data as nodes in the IoT. In this context, mobile cloud services that enable widespread data collection through mobile devices and collaborative use of mobile devices to enhance existing and realize new applications are very much of interest. As such, the MWC has come to the picture seeking solutions for computing and IT infrastructures to be energy efficient and environmentally friendly. This special issue is in response to the increasing convergence between MWC and cloud services, while different approaches exist, challenges and opportunities are numerous in this context. The research papers selected for this special issue represent recent progresses in the field, including works on services computing and modeling, mobile cloud, U-Care cloud, vehicle networks, energy-aware architectures, and wireless sensor network technologies and applications. This special issue includes four extended version of the selected paper originally presented at the 17<sup>th</sup> Mobile Computing Workshop (MC, 2012) and the 8<sup>th</sup> Workshop on Wireless, Ad Hoc and Sensor Networks (WASN, 2012), held at Taipei, Taiwan; one extended version of the selected paper originally presented at the 4<sup>th</sup> IEEE International Conference on Cloud Computing Technology and Science (IEEE CloudCom, 2012), held at Taipei, Taiwan; and one regular submission with 20% average acceptance rate for 2012 submissions in IJGHPC. The papers selected for this issue not only contribute valuable insights and results but also have particular relevance to the mobile, wireless and cloud computing community. All of them present high quality results for tackling problems arising from the ever-growing mobile and cloud services. We believe that this special issue provides novel ideas and state-of-the-art techniques in the field, and stimulates future research in the mobile and wireless services in clouds.*

**Keywords:** *Mobile Cloud, Mobile and Wireless Computing (MWC), Sustainable Computing, Ubiquitous Cloud Services, Vehicle Network*

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## MOBILE CLOUD

With the advance on cloud computing and wireless communication technology, using mobile devices to access cloud services becomes common nowadays. The provision of mobile cloud service calls for a wireless access infrastructure that offers high bandwidth to mobile users. Among all enabling technologies, wireless mesh networks (WMNs) have the advantage of low deployment cost and widely available user equipments. To provide more bandwidth, access points in WMNs are commonly equipped with multiple wireless interfaces (radios) that can operate on multiple non-overlapping channels in parallel. The objective of channel assignments in a multi-channel, multi-radio MWN is to reduce co-channel interference experienced by links so as to increase network capacity while maintaining network connectivity. The paper by Yuan-Kao Dai, Li-Hsing Ye n and Jia-Wei Su, entitled “*Toward an Access Infrastructure for Mobile Cloud: A Channel Assignment Scheme for Wireless Mesh Networks*”, proposed the concept of co-channel interference at the physical layer. A simulated annealing method is employed in their proposed technique. The experimental results show that, compared with traditional heuristic-based and game-theoretic approaches, the proposed simulated annealing algorithm can provides significant improvements in network connectivity.

## VEHICLE NETWORK

The rapid progress of wireless technologies has made the information of real-time traffic available to vehicles. The paper by Shih-Lin Wu, Jhe-yu Jhou and Yi-Chun Lin entitled “*A Novel Path Planning to Provide Real-time Backup Paths for Vehicle Navigation Systems*” proposes a dynamic path planning algorithm for vehicle navigation system which can adapt to changeable traffic and re-plan a better path with good travelling time for drivers within a reasonable computation time for large-scale

road networks. Based on the hierarchical model of road networks, this paper uses source-directed A\* to create a driving path and a backup path tree by considering the geographical position of destination and the current travelling time of road links. Whenever a traffic condition of a link in the driving path becomes worse, the re-planning of a new partial path from a certain part of the tree reflected by the link is performed. It is expected that the proposed algorithm can always navigate vehicles to the better path with a good travelling time by avoiding traffic jam roads. As a result, the condition of traffic jam roads can be further alleviated. The system has been implemented and tested on Taiwan road network. Through testing results, the authors demonstrated that the system presents a good efficiency for planning / re-planning a path in terms of planning time and travelling time.

## COMPUTATIONAL SUSTAINABILITY

Wireless Sensor Networks (WSNs) have attracted much attention in research and application fields with regard to the cloud computing services. In wireless sensor networks, due to limited energy, how to disseminate the event data in an energy-efficient way to allow sinks quickly querying and receiving the needed event data is a practical and important issue. The paper by Shiow-Fen Hwang, Han-Huei Lin, Chyi-Ren Dow entitled “*An Energy-Efficient Data Dissemination Scheme in Large-Scale Wireless Sensor Networks*” proposed an energy-efficient data dissemination scheme in large-scale wireless sensor networks. The main idea of this work is to divide the grids into levels and regions to reduce the amount of data storing in the storage areas and the range of query. A novel data query algorithm to reduce the delay time of query is also presented. The simulation results show that the proposed scheme provides superior performance in terms of the energy consumption and control overhead.

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