AN ADAPTIVE JOINT RESOURCE ALLOCATION SCHEME FOR HETEROGENEOUS WIRELESS NETWORKS USING STEM CELL REGENERATION MECHANISM

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Abstract. *It was reported that the distribution of traffic flows among different radio access networks can enable better network utilization than the data transmission via single network. Joint radio resource management is a process that can efficiently manage the allocation and deallocation of radio resources among different radio access technologies so that mobile users are allowed to enjoy seamless services via various radio access technologies. An adaptive joint radio resource management scheme is proposed to adapt to the volatile change characteristics in heterogeneous wireless networks. Besides a call admission control, a joint resource reallocation module that is inspired by the concept of stem cell regeneration is adopted to achieve efficient utilization of multiple radio access networks via bio-inspired control and optimal reassignment of available bandwidth for heterogeneous wireless networks. A series of simulations was conducted to compare the proposed scheme with two representative joint radio resource management schemes in the literature. The capability of self-adaption in volatile radio access networks assists in the effectiveness and practicability of the proposed work.*
Keywords: Radio access networks, Joint radio resource management, Stem cell regeneration, Call admission control, Optimization

1. **Introduction.** Since the resource in a heterogeneous wireless network system is limited and a variety of applications emerge with different bandwidth requirements for multimedia access, gaming, and collaboration, the radio resource management in heterogeneous wireless networks, especially for managing the precious bandwidth in order to provide acceptable quality-of-service (QoS) for the fast growing real-time services, turns out to be a critical problem. The main focus of the resource management in heterogeneous wireless network access includes bandwidth utilization improvement, resource consumption reduction, load balancing among radio access technologies and traffic flow stabilization in the hybrid Wireless Local Area Networks (WLANs), Wireless Metropolitan Area Networks (WMANs) and Wireless Wide Area Networks (WWANs).

Over the past few years, multihoming has been widely utilized for improving wide-area network performance and lowering bandwidth costs [1,2]. A flow control framework for heterogeneous network access by the mobile users with multihoming capabilities was recently proposed in [3]. Multihoming is a technique to increase resilience to path failure. The multihomed nodes are able to be simultaneously connected through multiple access technologies, and even multiple end-to-end paths. For example, a mobile user obtains simultaneous Internet connectivity through a wireless local area network using IEEE