INTELLIGENT RESOURCE MANAGEMENT SCHEMES FOR HETEROGENEOUS WIRELESS NETWORKS

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Abstract. The integration of Wireless Metropolitan Area Network (WLAN) and Wireless Local Area Network (WMAN) technologies seems to be a feasible option for better and cheaper wireless coverage extension. WMAN/WLAN networks is still a challenging issue to be tackled. This work thus incorporates a variant of the particle swarm optimization (PSO) algorithm, the so-called immune binary particle swarm optimization algorithm (IBPSO), into the design of the dynamic resource management scheme for heterogeneous wireless networks to effectively reduce the dropping probability of handoff calls and to maximize bandwidth utilization. The simulation results show that our scheme is effective in terms of performance metrics, including dropping probability of handoff calls, new call blocking probability, throughputs and bandwidth utilization.

Keywords: Resource management, Heterogeneous wireless networks, Immune binary particle swarm optimization algorithm, Call dropping probability, Bandwidth utilization

1. Introduction. In considering next generation networks, a great deal of attention is being paid to resource allocation for providing seamless multimedia access within mobile communication networks. Recently, mobile wireless networks have been rapidly deployed, and one of the issues attracting interest in the literature is the realization of ubiquitous computing in wireless networking environments. There are two promising wireless technologies for wireless network deployment nowadays. WLAN includes WiFi, HIPER-LAN, DSRC, etc., whereas WMAN includes WiMAX, HIPERMAN, etc. WLAN using IEEE802.11 has been deployed widely despite its short coverage range.

To increase network utilization, the spatial domain in WMAN can be exploited by means of multi-antenna techniques in conjunction with efficient space division multiple access (SDMA) schemes [1]. The key element of the SDMA technique is an antenna array, which can be dynamically controlled to perform electrical beam steering to a desired direction, and null steering to reject interfering signals. In this study, IBPSO is employed for the realization of bandwidth allocation module due to its superior effectiveness for solving multi-objective optimization problems, as discussed in the literature [5]. IBPSO