

**AN EXTENDED ADAPTIVE MECHANISM
OF EVOLUTIONARY BASED
CHANNEL ASSIGNMENT VIA
REINFORCEMENT LEARNING ALGORITHM
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ABSTRACT

Current development in the field of wireless mobile communication is extremely limited by the capacity constraints of the available frequency spectrum. Hence proper utilisation of channel allocation techniques which are capable of ensuring efficient channel assignment is essential in order to solve the non-deterministic polynomial-time hard (NP-hard) channel assignment problem. The process of channel assignment must satisfy hard-constraints such as electromagnetic compatibility (EMC) and the demand of channels in a cell. Initial channel assignment parameters are obtained using self-learning scheme and evolutionary algorithms is used to fine-tune the estimated parameters from reinforcement learning algorithm to optimise the channel assignment problem in wireless mobile networks. Particle reselection and dynamic inertia approach in particle-swarm-optimisation (PSO) is shown to have 8 % improvement over the standard PSO algorithm. Subsequently, the introduction of PSO showed 70 - 75 % power saving advantage over suboptimal resource allocation techniques.



ABSTRAK

An Extended Adaptive Mechanism of Evolutionary based Channel Assignment via Reinforcement Learning Algorithm

Perkembangan dalam bidang komunikasi mudah alih tanpa wayar adalah sangat terhad kepada kekangan kapasiti atas spektrum frekuensi yang ada. Oleh itu, penggunaan teknik penentuan saluran yang betul di samping memastikan tugas saluran yang cekap adalah penting demi mengatasi masalah “non-deterministic polynomial-time hard (NP-hard)” dalam tugas saluran. Selain itu, proses tugas saluran mesti memenuhi kekangan keras seperti keserasian elektromagnet (EMC) dan permintaan saluran dalam sel. Di peringkat awal, parameter tugas channel diperoleh melalui skim pembelajaran sendiri dan algoritma evolusi digunakan untuk memperincikan parameter anggaran daripada pengukuhan pembelajaran algoritma supaya dapat mengoptimumkan masalah tugas saluran dalam rangkaian mudah alih tanpa wayar. Pilihan semula zarah dan pendekatan inersia dinamik dalam “particle-swarm-optimisation” (PSO) telah ditunjukkan mempunyai peningkatan 8 % berbanding dengan algoritma PSO yang biasa. Pengenal PSO juga menunjukkan 70 - 75 % lebih jimat kuasa berbanding dengan teknik-teknik penentuan sumber yang sub-obtimum.

