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AN EFFICIENT SIMULATED ANNEALING WITH A VALID SOLUTION MECHANISM FOR TDMA BROADCAST SCHEDULING PROBLEM

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Abstract. *This paper presents an efficient Simulated Annealing with valid solution mechanism for finding an optimum conflict-free transmission schedule for a broadcast radio network. This is known as a Broadcast Scheduling Problem (BSP) and shown as an NP-complete problem in earlier studies. Because of this NP-complete nature, earlier studies used genetic algorithms, mean field annealing, neural networks, factor graph and sum product algorithm, and sequential vertex coloring algorithm to obtain the solution. In our study, a valid solution mechanism is included in simulated annealing. Because of this inclusion, we are able to achieve better results even for networks with 100 nodes and 300 links. The results obtained using our methodology is compared with all the other earlier solution methods.*

Keywords: Broadcast scheduling problem, Packet radio network, Efficient simulated annealing, Time-division multiple access (TDMA), Optimum transmission schedule

1. **Introduction.** Packet Radio Network (PRN) provides high speed wireless packet data services to a group of stations over a broad geographic region. The stations in the network share a single radio channel. Each station in the network has a transceiver unit and a control unit. Stations can either transmit or receive packets using the shared radio channel at each time instant. The control unit schedules the traffic according to a channel access protocol. Because of this, Packet radio network (PRN) design is an important issue in communication services and distributed communication applications [1].

Packet radio network adopts time-division multiple-access (TDMA) protocol for nodes to communicate each other in a single shared radio channel. TDMA is a digital transmission technology which allows a number of users to access a single radio frequency channel without interference by allocating unique time slots to each user (station) within each channel. The time is divided into distinct TDMA frames and the frames consists of a